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WAR MACHINE

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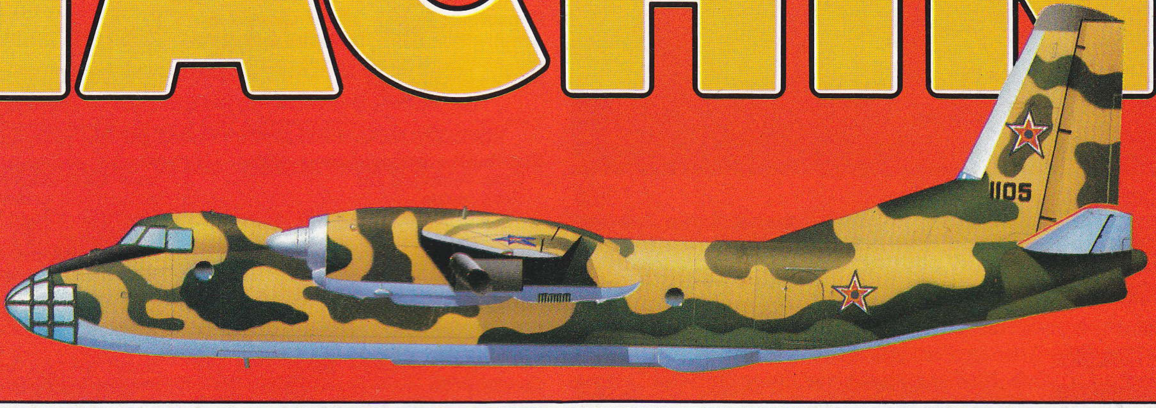
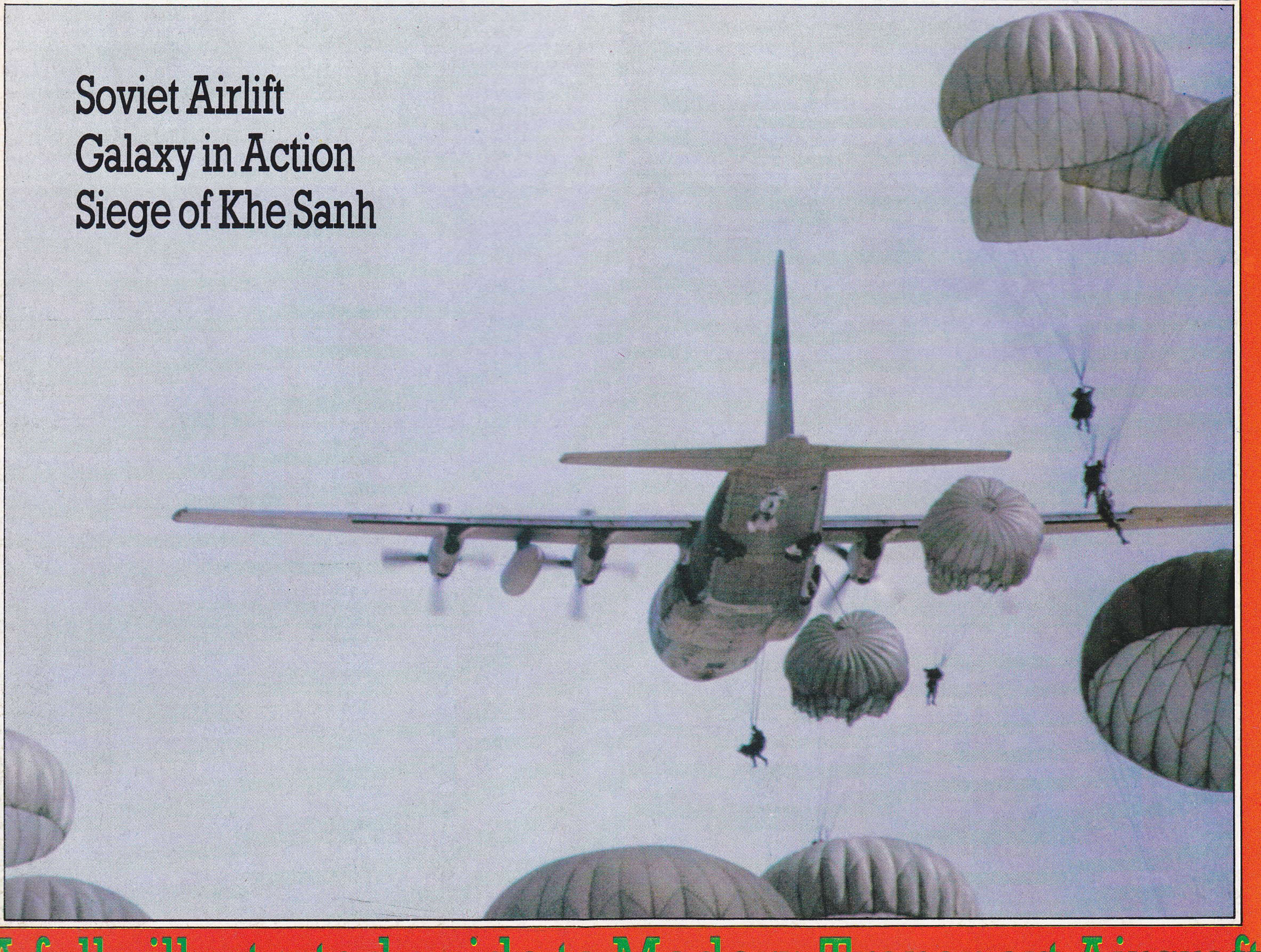
80p 52

IR £1 Aus $1.95 NZ $2.25 SA R1.95 Sing $4.50 USA & Can $1.95





Soviet Airlift
Galaxy in Action
Siege of Khe Sanh

A fully illustrated guide to Modern Transport Aircraft

WAR MACHINE

Volume 5 **Issue 52**

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Published by
Orbis Publishing Ltd
© Aerospace Publishing Ltd 1984
Colour profiles, diagrams and cutaway drawings © Pilot Press Ltd

Editorial Offices
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London W4 4PH
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Design: Rod Teasdale

Colour Origination: Imago Publishing Ltd, Thame, Oxon

Typesetting: SX Composing Ltd

Film work: Precise Litho Ltd

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30848

Printed in Great Britain by The Artisan Press Ltd

Consultant Editor: Major General Sir Jeremy Moore KCB OBE MC, Commander of British Land Forces during the Falklands campaign.

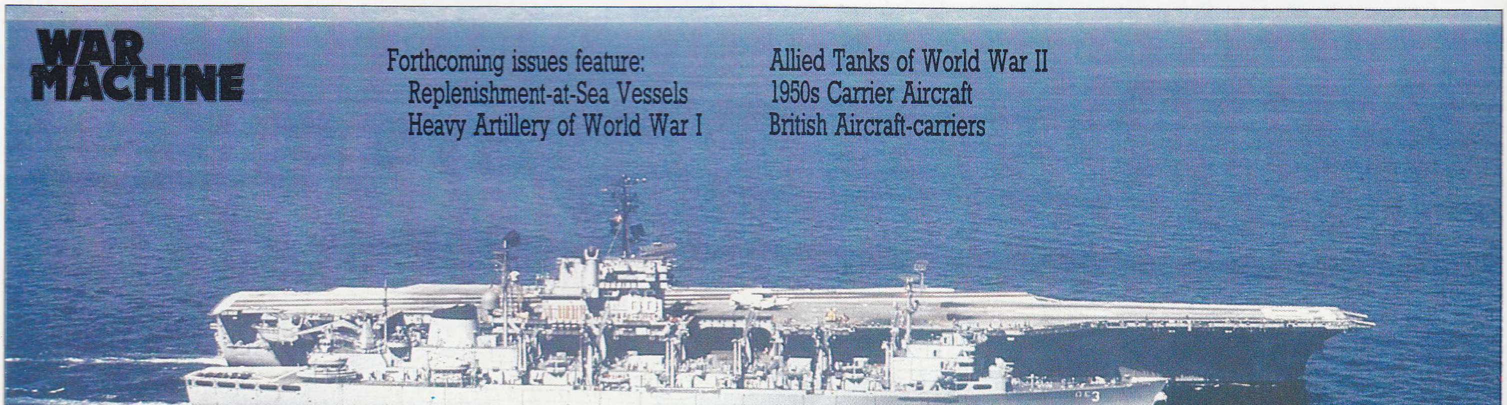
Distribution and marketing offices:
Orbis Publishing Ltd
Orbis House
20-22 Bedfordbury
London WC2N 4BT
Telephone: 01-379 6711
Circulation Director: David Breed
Marketing Director: Michael Joyce

WAR MACHINE
Price UK 80p. IR £1. Aus $1.95. NZ $2.25. SA R1.95. Singapore $4.50. USA and Canada $1.95
How to obtain your copies of WAR MACHINE: Copies are obtainable by placing a regular order at your Newsagent, or by taking out a subscription.
Subscription Rates
For six months (26 issues) £23.80; for one year (52 issues) £47.60. Send your order and remittance to Punch Subscription Services, Watling Street, Bletchley, Milton Keynes, Bucks MK2 2BW, being sure to state the number of the first issue required.
Back Numbers
UK & Eire: Back numbers are obtainable from your Newsagent or from WAR MACHINE Back Numbers, Orbis Publishing Limited, 20-22 Bedfordbury, London WC2N 4BT at cover price.
Australia: Back numbers are obtainable from WAR MACHINE Back Numbers, Gordon & Gotch (Aus) Ltd, 114 William Street, PO Box 767G, Melbourne, Vic 3001.
South Africa, Europe, Malta and New Zealand: Back numbers are available at cover price from your Newsagent. In case of difficulty write to the address in your country given for binders. South African readers should add sales tax.
How to obtain binders for WAR MACHINE
UK & Eire: Send a cheque or Postal Order for £3.95 per binder (incl p & p) payable to Orbis Publishing Ltd to WAR MACHINE Binders, Orbis House, 20-22 Bedfordbury, London WC2N 4BT
Europe: Write with remittance of £5.00 per binder (incl p & p) payable to Orbis Publishing Ltd to WAR MACHINE Binders, Orbis House, 20-22 Bedfordbury, London WC2N 4BT.
Malta: Binders are obtainable through your local Newsagent, price £3.95. In case of difficulty write to WAR MACHINE Binders, Miller (Malta) Ltd, M.A. Vassalli Street, Valletta, Malta.
Australia: For details of how to obtain your binders see inserts in early issues or write to WAR MACHINE Binders, First Post Pty Ltd, 23 Chandos Street, St Leonards, NSW 2065. The binders supplied are those illustrated in the magazine.
New Zealand: Binders are available through your local Newsagent or from WAR MACHINE Binders, Gordon & Gotch (NZ) Ltd, PO Box 1594, Wellington.
South Africa: Binders are available through any branch of Central News Agency. In case of difficulty write to WAR MACHINE Binders, Intermag, PO Box 57394, Springfield 2137.

Note: Binders and Back Numbers are obtainable subject to availability of stocks. Whilst every attempt is made to keep the price of the issues and binders constant, the publishers reserve the right to increase the stated prices at any time when circumstances dictate. Binders depicted in this publication are those produced for the **UK market only** and may not necessarily be identical to binders produced for sale outside the UK. Binders and issues may be subject to import duty and /or local taxes, which are not included in the above prices unless stated.

The WAR MACHINE published by Orbis Publishing Ltd has no connection with the WAR MACHINE published by Emjay. The latter is a magazine devoted to computer simulation gaming and further information and subscription details can be obtained from Emjay, 17 Langbank Avenue, Rise Park, Nottingham NG5 5BU, England.

Picture acknowledgements
Cover photograph: Lockheed Corporation. **1021:** US Army/US Air Force. **1024:** US Department of Defense. **1025:** US Department of Defense. **1026:** Gamma/Japanese Air Self-Defense. **1027:** Aeritalia. **1028:** Lockheed Corporation/US Air force. **1029:** US Air Force. **1034:** US Air Force/US Air Force. **1035:** US Air Force/US Air Force. **1037:** (all) US Air Force. **1038:** US Air Force/US Air Force. **1040:** Fokker BV.



WAR MACHINE

Forthcoming issues feature:
Replenishment-at-Sea Vessels
Heavy Artillery of World War I
Allied Tanks of World War II
1950s Carrier Aircraft
British Aircraft-carriers

Modern Transport Aircraft

From running almost scheduled services from the USA to bases worldwide, through large-scale tactical exercises from South Africa to Poland, to the supply of isolated garrisons from South Georgia to Kabul, the modern transport aircraft has become an essential part of the military inventory.

Nightfall, somewhere in Germany, and a Lockheed C-130 Hercules is loading equipment for the 2nd US Cavalry Division. Less than a day earlier, the division had been at home in Fort Hood, Texas, but military airlift has made possible rapid deployment around the world.

Often mockingly called 'trash-haulers' by their flamboyant fighter pilot brethren, those who crew military transport aircraft undoubtedly have the thin end of the wedge as far as personal glorification is concerned. This is not to say that opportunities to display conspicuous gallantry do not occur (a close look at the feature on Khe Sanh will soon confirm that they do), but rather that much of their duty centres around the humdrum and unglamorous movement of men and equipment, often to points well behind the front line and far removed from 'the action'.

For all that, the work of transport aircraft and their crews is vital to today's air arms, for without the all-important logistical back-up that they provide modern air forces would very quickly be reduced to a state of non-effectiveness. Consequently, defence budgets throughout the world feature substantial allocations of money to cover both the procurement and operation of tactical and strategic transport aircraft.

In addition, the design and manufacture of transport aircraft, although still expensive, is by no means so costly an exercise as that of fighters or bombers, so a number of smaller nations have endeavoured partially to satisfy their own requirements in this field, and such a 'go it alone' policy has paid handsome dividends in several cases, examples being provided by Fokker and de Havilland Canada, both of which have earned substantial amounts of valuable exchange through the export of their products.

A major US military strength is the capacity to airlift almost any piece of US Army equipment (including helicopters and main battle tanks) in the capacious hold of such aircraft as this massive Lockheed C-5 Galaxy. Only the Soviet Union has a comparable capacity.

USSR

Antonov An-12 'Cub'

The Soviet contemporary of Lockheed's hugely successful Hercules, the **Antonov An-12 'Cub'** has proved to be rather less versatile than its American equivalent but nevertheless forms an important part of Soviet air power, and the type is also operated by the air arms of Algeria, Bangladesh, Egypt, India, Indonesia, Iraq, Poland, Sudan and Yugoslavia. Development of the An-12 can be traced back to the mid-1950s, initial Soviet attempts to marry turbine power to tactical airlift resulting in the appearance of the twin-engine **An-8 'Camp'** which was built in modest numbers. This, in turn, led to the **An-10 'Cat'**, a four-engine type developed specifically for service with Aeroflot from 1959 although it has since been retired, probably as a result of serious structural shortcomings.

Further refinement of the An-10 design resulted in the An-12, which flew for the first time in 1958 and which began to join V-TA (Voenno-Transportnaya Aviatsiya, or Air Transport Aviation) units in 1960, very quickly becoming the standard Soviet tactical freighter. To meet military requirements a number of changes were made from the earlier An-10, the most significant being the provision of an integral rear loading ramp whilst the type also incorporated a tail turret with a pair of 23-mm Nudelmann-Richter NR-23 cannon for defensive purposes. Payload is 100 paratroops or 20000 kg (44,092 lb) of freight.

In addition to the large number of **An-12BP 'Cub-A'** pure transport aircraft, two other derivatives are known to exist, these being the **'Cub-B'** and **'Cub-C'** in NATO parlance. The former is concerned principally with the acquisition of ELINT and has been noted in the vicinity of NATO exercises on a number of occasions. Featuring numerous ventral fairings housing receiver aerials, the 'Cub-B' is one of a number of Soviet types engaged in such duties. The 'Cub-C', on the other hand, would appear to have more warlike applications, being an ECM platform incorporating several prominent radomes as well as a rear installation in place of the tail turret. In practice, however, it too is almost certainly mainly concerned with the acquisition of data relating to potentially hostile forces.

Interestingly, like the Hercules the An-12 has also been pressed into service as a makeshift bomber, India's air force employing the type in this role during the 1965 Indo-Pakistan conflict.

The world's fourth-largest air force, India uses large numbers of Soviet transports including Nos 25 and 44 Sqns equipped with the An-12BP. Soon to be supplemented by the Il-76TD, these robust machines make frequent visits to airfields in Western Europe collecting hardware.

Specification

Antonov An-12BP 'Cub-A'

Type: tactical transport aircraft

Powerplant: four 4,000-ehp (2983-ekW) Ivchenko AI-20K turboprops

Performance: maximum cruising speed 670 km/h (416 mph); service ceiling 10200 m (33,465 ft); range 3600 km (2,236 miles) with maximum 20000-kg (44,092-lb) payload

Weights: empty 28000 kg (61,730 lb); maximum take-off 61000 kg (134,480 lb)

Dimensions: span 38.00 m (124 ft 8 in); length 37.00 m (121 ft 4 in); height 9.83 m (32 ft 3 in); wing area 119.5 m^2 (1,286.3 sq ft)

USSR

Antonov An-22 'Cock'

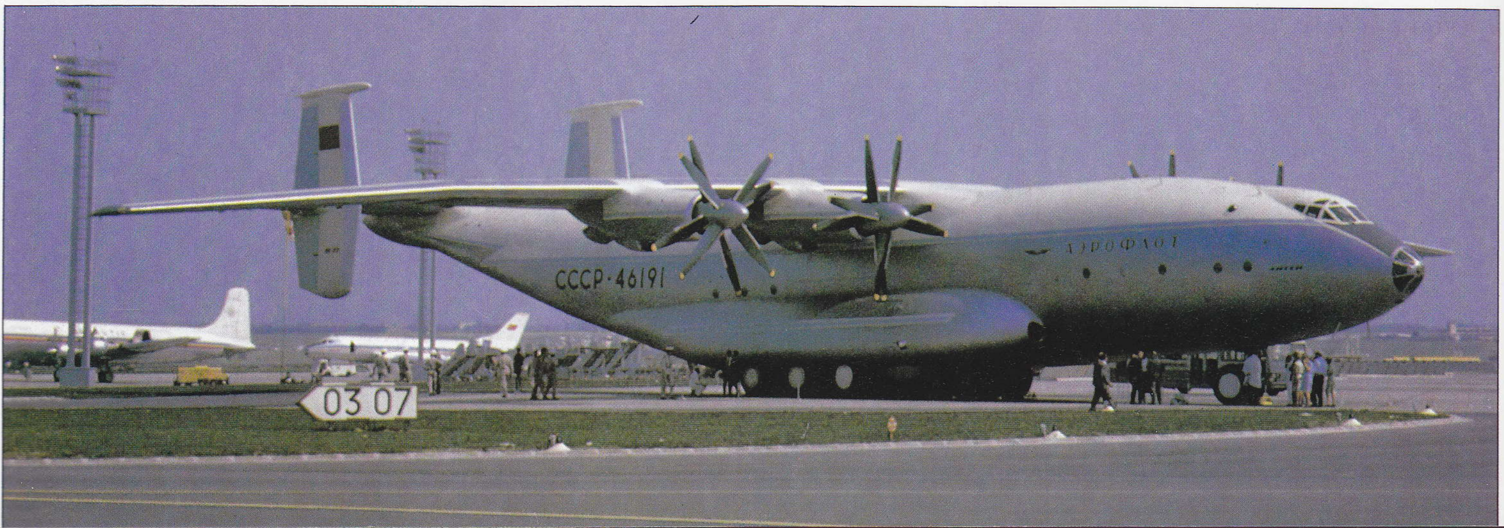
Arising out of separate but compatible civil and military requirements for a freighter aircraft capable of handling such outsize cargo as heavy construction equipment or armoured vehicles, the **Antonov An-22 'Cock'** at present serves with both Aeroflot and the V-TA in relatively modest quantities, and is still one of the world's largest and most impressive aircraft.

Before its sudden and unexpected revelation to the West when it appeared at the Paris air show in June 1965, the An-22 had begun development in 1962, and is essentially a scaled-up version of the earlier An-12. Such an exercise is often rather risky although in this instance it was successfully accomplished, the most notable difference in shape between these two types centering around the aft fuselage section and the empennage.

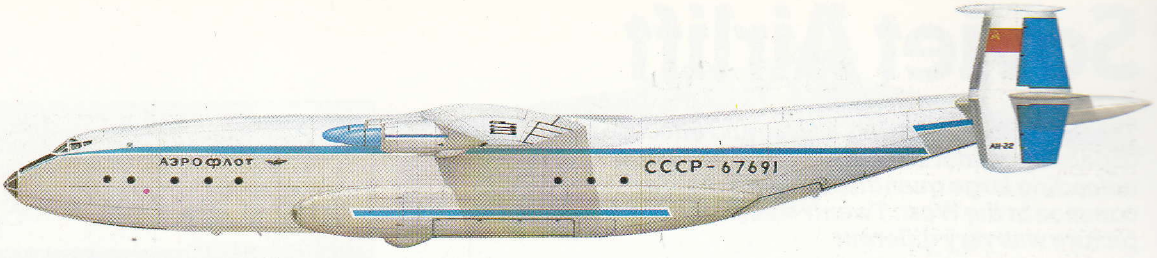
Flown for the first time on 27 February 1965, the An-22 was, for its size, introduced to service quite quickly, initially with Aeroflot during 1967, and until the advent of the Lockheed C-5 Galaxy in June 1968 it held the distinction of being the world's largest and heaviest aircraft. Precise production figures are not available although it is generally accepted that approximately 100 were built by the time the line closed in about 1974, these being distributed fairly evenly between Aeroflot and the V-TA. In practice, however, the Aeroflot machines are virtually identical to their military counterparts and they are frequently employed by the Soviet military, especially on flights to sensitive areas.

Capable of operation from unprepared landing strips, the An-22 is normally manned by a crew of five or six, can accommodate 29 passengers in a pressurized forward compartment,

The sudden appearance of the An-22 prototype at Paris Le Bourget in 1965 caused a sensation. Production An-22s have three nose radars (this first example had only one, under the front of the right main-gear fairing). Virtually all Soviet high-wing transports have anhedral.



Antonov An-22 'Cock' (continued)



All Aeroflot's aircraft are available for immediate military operations. Only a relatively small number of An-22 heavy long-range cargo aircraft were built; this is one of the Aeroflot examples, of which some 30 (of 50) remain in service.

and can easily swallow all existing Soviet armoured fighting vehicles including the T-72 main battle tank. To facilitate the loading of cargo, the pressurized hold incorporates mechanical handling devices such as electric roof cranes and winches, whilst the rear hold doors can be opened in flight to permit aerial resupply to be undertaken.

Specification

Antonov An-22 'Cock'
Type: strategic transport aircraft
Powerplant: four 15,000-ehp (11185-ekW) Kuznetsov NK-12MA turboprops
Performance: normal cruising speed 640 km/h (398 mph); service ceiling 7600 m (24,935 ft); range 5000 km (3,107 miles) with maximum 80000-kg (176,370-lb) payload
Weights: empty about 114000 kg (251,327 lb); maximum take-off 250000 kg (551,156 lb)
Dimensions: span 64.40 m (211 ft 3.5 in); length 57.90 m (189 ft 11.5 in); height 12.53 m (41 ft 1.5 in); wing area 345.0 m² (3,713.6 sq ft)

USSR

Antonov An-26 'Curl', An-30 'Clank' and An-32 'Cline'

Evolved from the An-24 civil airliner which entered Aeroflot service in October 1962, the **Antonov An-26 'Curl'** light freighter first appeared in 1969, and since that time has become the Warsaw Pact's standard light tactical transport type, also achieving a quite significant degree of export success, examples being supplied to a number of nations such as Afghanistan, Congo, Cuba, Iraq, Libya, Mali, North Korea and Somalia.

Featuring a redesigned aft fuselage section with a rear ramp to facilitate loading and unloading, the An-26 also has a large bulged observation window on the port side of the forward fuselage, possibly to assist in para-dropping missions. Powerplant configuration is also unusual in that the An-26 has a small turbojet engine in the starboard nacelle, this being intended to enhance field performance in hot-and-high conditions. Up to 40 paratroops can be accommodated, though a more common payload is up to 4500 kg (9,921 lb) of freight.

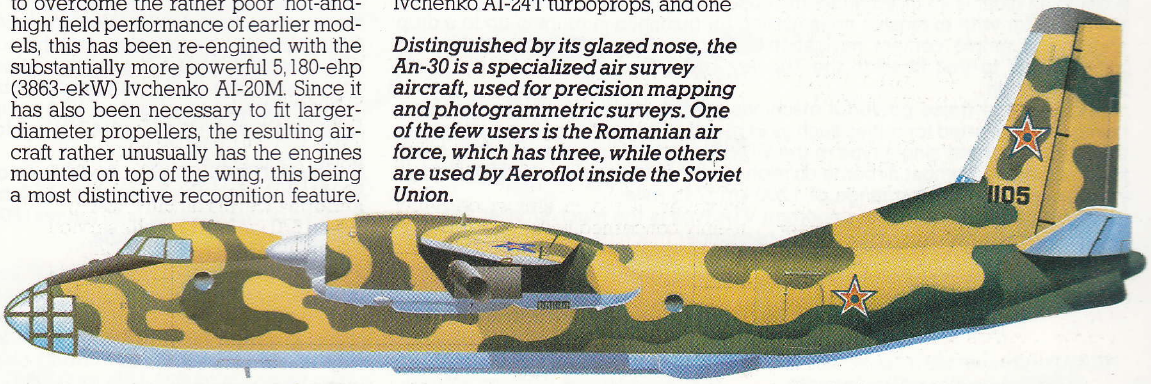
Another derivative of the family, and one which is only in fairly limited military service, is the **An-30 'Clank'**, the existence of which became known during 1974. Optimized for photographic survey tasks, this is instantly recognizable by its extensive glazing in the vicinity of the nose section, which has necessitated redesign of the cockpit, but the An-30 also possesses several ventral ports for cameras and associated survey apparatus.

The third and newest variant to appear is the **An-32 'Cline'**, which was revealed to the West in 1977. Intended to overcome the rather poor 'hot-and-high' field performance of earlier models, this has been re-engined with the substantially more powerful 5,180-ehp (3863-ekW) Ivchenko AI-20M. Since it has also been necessary to fit larger-diameter propellers, the resulting aircraft rather unusually has the engines mounted on top of the wing, this being a most distinctive recognition feature. Thus far, only India is known to operate this variant, her air force being due to receive 95 in all, but the type may well find favour by operators in other hot-and-high countries in due course. The maximum payload is 6000 kg (13,228 lb).

Specification

Antonov An-26 'Curl'
Type: tactical transport aircraft
Powerplant: two 2,820-ehp (2103-ekW) Ivchenko AI-24T turboprops, and one 900-kg (1,984-lb) thrust Tumansky RU-19-300 auxiliary turbojet
Performance: maximum cruising speed 440 km/h (273 mph); range with 6000-kg (13,228-lb) payload 1100 km (683 miles)
Weights: empty 15020 kg (33,113 lb); maximum take-off 24000 kg (52,911 lb)
Dimensions: span 29.20 m (95 ft 9.5 in); length 23.80 m (78 ft 1 in); height 8.32 m (27 ft 3.5 in); wing area 74.98 m² (807.1 sq ft)

Distinguished by its glazed nose, the An-30 is a specialized air survey aircraft, used for precision mapping and photogrammetric surveys. One of the few users is the Romanian air force, which has three, while others are used by Aeroflot inside the Soviet Union.



USSR

Antonov An-72 'Coaler'

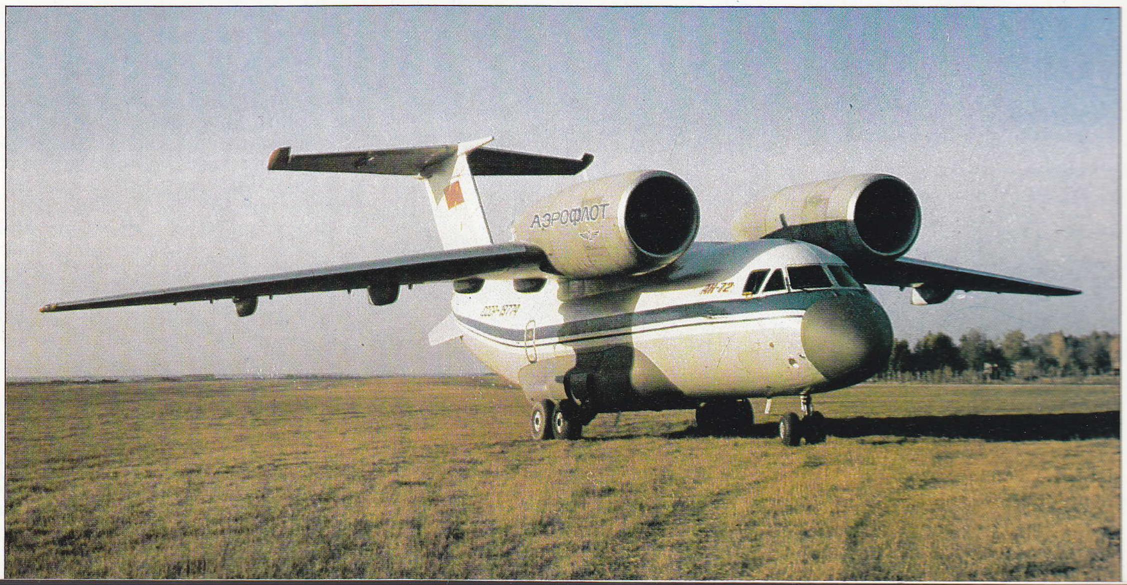
Conceived to replace the turbine-powered Antonov An-26 family of light tactical transport aircraft, the **Antonov An-72 'Coaler'** is now in production for the Soviet armed forces and bears a quite striking resemblance to the Boeing YC-14.

The first jet type to be produced by the Antonov design bureau, the 'Coaler' made its maiden flight in December 1977 and was revealed to the West fairly soon afterwards. Using twin-turbofan propulsion and featuring the Boeing-developed 'upper-surface-blowing' (USB) concept to improve STOL performance, the An-72 is rather smaller than its American predecessor but is capable of rough-field operation and, like the An-26, has a rear cargo door and ramp to facilitate loading and unloading.

In addition to USB, the wing structure also incorporates full-span slats and double-slotted trailing-edge flaps on the outer sections. The landing gear comprises four independent single-wheel units which retract into fairings on the side of the fuselage, plus a twin-wheel nose unit, whilst prominent ventral fins fitted to the aft fuselage section close to the cargo ramp is intended to limit turbulence in the vicinity of the tail and thus permit parachute dropping. As far as payload capability is concerned, the An-72 freighter can also carry approximately 32 fully-equipped troops and about 6800 kg (14,990 lb) of cargo.

Specification

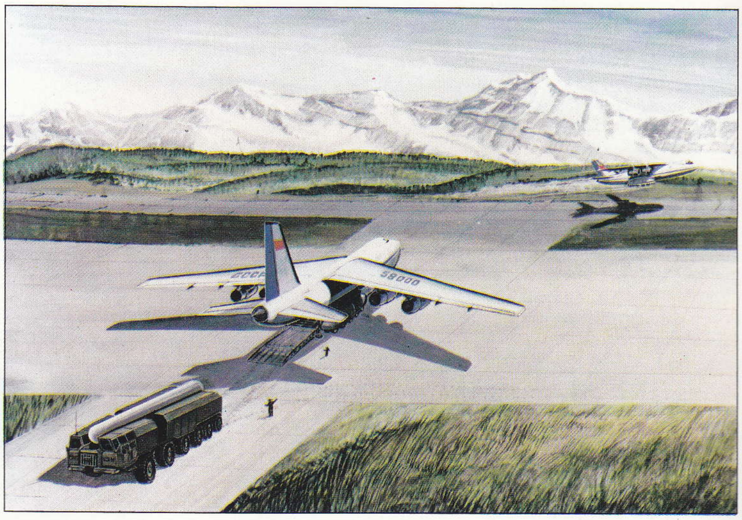
Antonov An-72 'Coaler'
Type: tactical transport aircraft
Powerplant: two 6500-kg (14,330-lb) thrust Lotarev D-36 turbofans
Performance: cruising speed 720 km/h (447 mph); service ceiling 11000 m (36,090 ft); range 3200 km (1,988 miles) with maximum fuel
Weights: empty about 18000 kg (39,863 lb); maximum take-off 30500 kg (67,240 lb)
Dimensions: span 25.83 m (84 ft 9 in); length 26.58 m (87 ft 2.5 in); height 8.24 m (27 ft 0.5 in); wing area about 110 m² (1,184 sq ft)



The Antonov An-72 was in effect a scaled-down version of the Boeing YC-14, using the same principle of USB (upper-surface blowing) to achieve STOL performance. This first prototype had a stumpy tail with large sloping strakes on the sides of the rear fuselage.

Soviet Airlift

That the Soviet Union has a large and effective military airlift capability cannot be in doubt, pictures of transports unloading large quantities of equipment at Kabul being common in the West. Twenty-five years ago, however, the picture was very different.



An impression taken from the US Department of Defense publication 'Soviet Military Power' of two Antonov An-400 'Condors' in operation. Typical of the heavy equipment to be carried will be the mobile SS-20 triple-warheaded IRBM.

Until the late 1950s the Soviet air forces had only quite small transport aircraft, such as the Ilyushin Il-12 and Lisunov Li-2 (Soviet version of the DC-3), each able to carry about 24 troops but no bulky cargo. Gradually, as in every other aspect of warfare, the situation has been changed by the acquisition on a massive scale of aircraft fully comparable with anything in the West. Indeed, today the world's biggest and heaviest aircraft is being readied for service with the VTA (air transport aviation).

Though the VTA, which is an integral element of the V-VS (air forces), is already an enormous and highly capable force, it is backed up by Aeroflot, which is by far the world's largest civil air organization. Most new transport aircraft are produced in both civil and military versions, and when it comes to heavy airlift cargo machines there is hardly any difference. Even turrets are fitted to the Aeroflot aircraft, just the guns being removed!

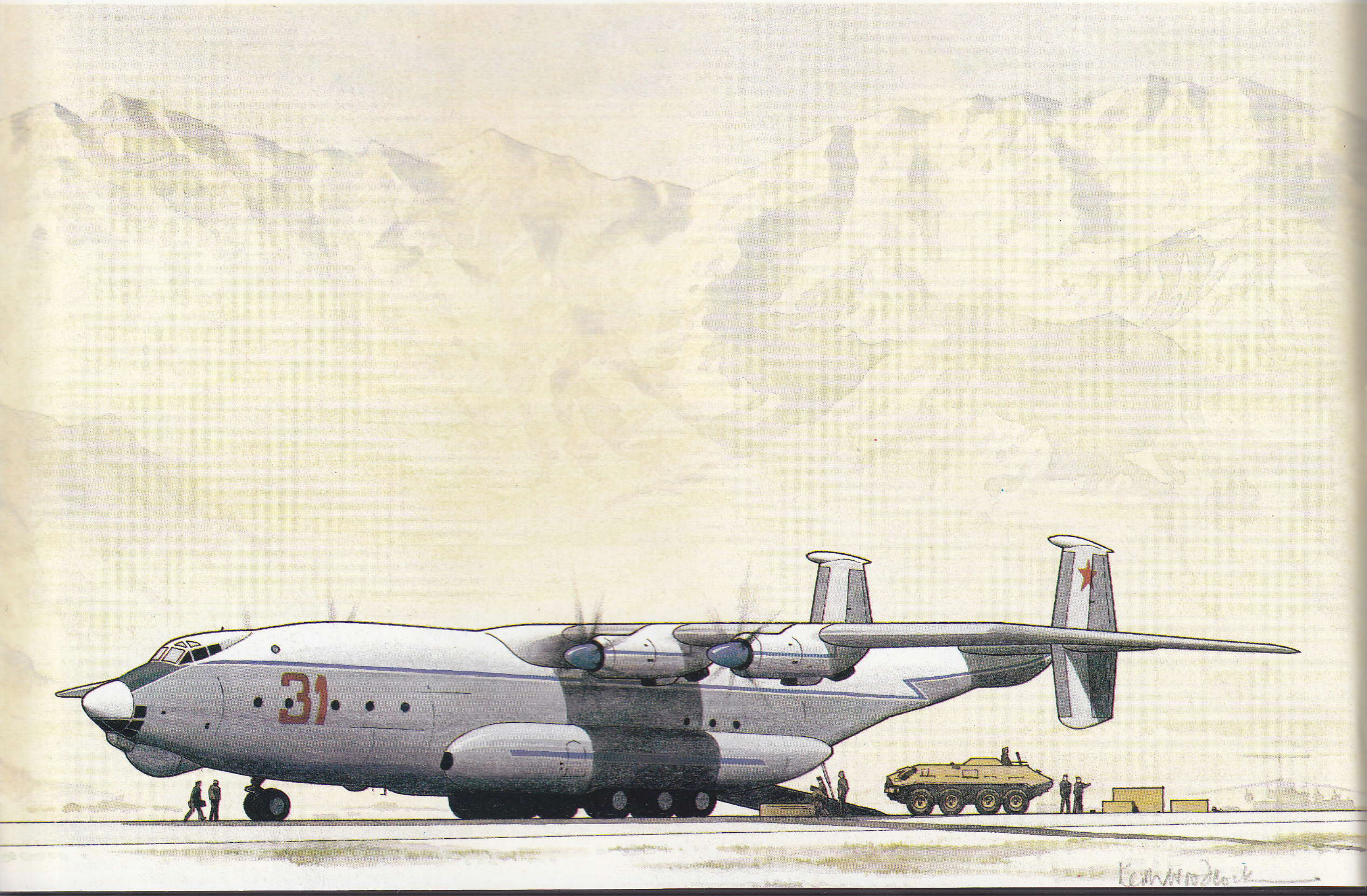
Since 1959 the mainstay of the VTA has been the Antonov An-12BP (called 'Cub' by NATO), which is a close counterpart of the Lockheed C-130. Like the US type it has a cargo hold measuring about 2.5 m (8.2 ft) square in cross section, able to take a wide range of vehicles including armoured personnel carriers, missiles on their launchers, amphibious light tanks and large radars. Alternatively about 100 paratroops can be seated on light fold-down seats, and all can jump in a pair of close sticks from left and right side doors at the rear. Like all large VTA transports the An-12BP has main landing gears designed when necessary to use soft unpaved airstrips, and the crew can adjust the tyre pressures in flight according to the aircraft weight and the kind of surface on which it is next to land. A mapping radar is installed under the nose, which contains a compartment for the navigator with extensive nose glazing for guidance in running up to a drop area and for simple 'contact' navigation by map-reading. At the other end is a tail turret similar to that fitted to the Tupolev Tu-16 'Badger' bomber, with twin 23-mm cannon.

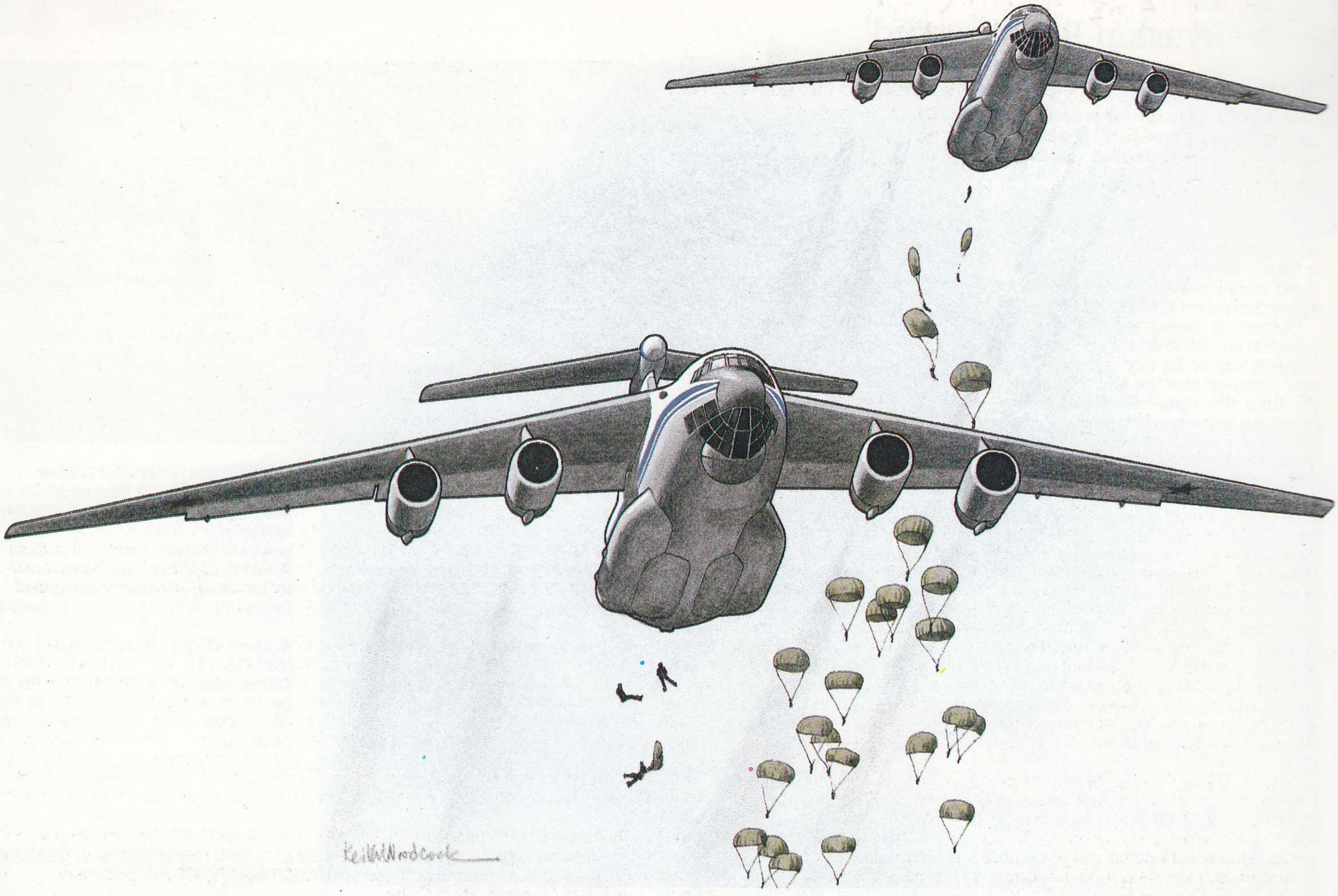
About 800 of these powerful machines were built, and though many have now been converted for duties such as Elint and ECM jamming, they still remain the most important single type in the VTA inventory. In emergency they could airlift about two combat airborne divisions (with all their flak, armour and other vehicles) over a nonstop range of 1200 km (745 miles).

Numerically the next most important VTA type is the much smaller Antonov An-26 'Curl'. Derived from the An-24 passenger machine, the An-26 is a twin-turboprop with a short range, the full load of 5500 kg (12,125 lb) being carried 1100 km (685 miles) without fuel reserves. In looks rather like a Fokker F.27 Friendship, the An-26 is typically Soviet in being solid, robust and heavy, needing more power than similar Western types yet carrying rather less. It has a rear ramp door for light vehicles, and the nose is occupied by a radar, though most VTA examples have a large observation blister on the left of the nose with an optical sight (like an old-fashioned bombsight) for accurate air dropping of cargo.

By far the biggest of current VTA equipment, Antonov's mighty An-22 (named Antei, but called 'Cock' by NATO) has four of the same giant 15,000-hp (11185-

Driving a BTR-60 out of an An-22 Antei of the Soviet VTA. Comparison with the An-22 prototype shows the three radars carried by the production machine. Payload of this monster is 80 tonnes (80000 kg/176,370 lb), and it has sufficient range to fly to Cuba.





kW) turboprops that power the Tupolev Tu-95 'Bear' bomber. Each of these NK-12MA engines drives an eight-bladed contraprop with a diameter of 6.2 m (20 ft 4 in), biggest in the world. The engines are hung on a high-mounted wing that seems amazingly small for such a huge aircraft; in fact the wing is very highly loaded indeed, but powerful double-slotted flaps enable normal runways to be used, and the take-off weight of 250000 kg (551,156 lb) is spread over a large ground area by three tandem sets of main wheels, 12 in all. Only about 50 An-22s are in VTA service, but they can carry almost anything over intercontinental distances.

Most important of current production VTA transports is the Ilyushin Il-76 'Candid'. The Il-76M and Il-76MD are very like the USAF Lockheed C-141, but as they have five sets of landing gears (each with a row of four wheels) they can use rough unpaved runways, and the four engines are not only much more powerful than those of the C-141 but all four also have very effective reversers, so the Il-76 is outstanding at getting into and out of short airstrips. The Il-76 factory at Tashkent is being greatly extended, partly to produce the tanker and AWACS versions of the same basic aircraft which are now in full production. About 320 of the Il-76M and Il-76MD versions have been delivered, representing one-third of the front-line assault transport force, and about 30 to 32 more aircraft join the VTA each year.

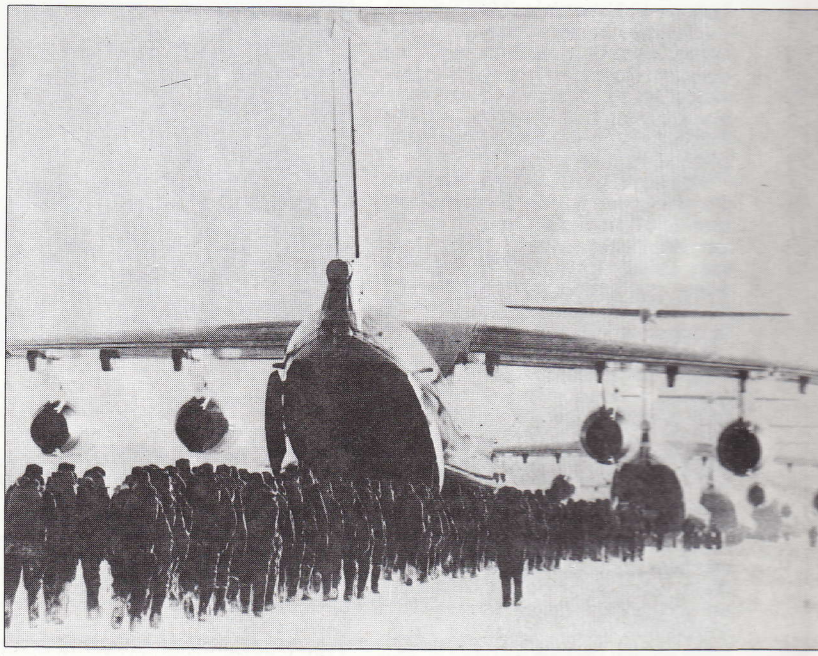
Condor enters service

The only item missing from the VTA has been a monster jet in the class of the USAF Lockheed C-5 Galaxy. This gap resulted from lack of a suitable engine, but with the development of the Lotarev D-18T, with a thrust of 23430 kg (51,654 lb), Antonov has been able to fly the first examples of his crowning achievement, the An-400, whose NATO name is 'Condor'. Though in 1984 the US Department of Defense estimated a typical load as 345 troops carried over 4200 km (2,600 miles), in fact the true capability must be far greater (an Ilyushin Il-86 of Aeroflot can do better than this!) and this troop load can be carried with maximum fuel, the range being some 8000 km (4,970 miles). The main duty would be carrying cargo, such as SS-20 missiles on their launchers. At least three of these formidable vehicles could be carried within the full load capability of 120000 kg (264,550 lb), the corresponding range being about 4600 km (2,850 miles). The An-400 has a wing span estimated at 74.2 m (243 ft 6 in); unlike most aircraft in this class it has the tailplane mounted on the fuselage instead of at the top of the fin. This huge machine will be in service in 1986-7.

The VTA also has enormous forces of transport helicopters. By far the most capable transport helicopter in the world, the Mil Mi-26 'Halo' has two engines of 11,400 hp (8500 kW) each and can carry more than 100 troops with full equipment. Numerically the chief transport helicopters are the Mi-8 and Mi-17, each bigger than a Sikorsky/Westland Sea King. Plants at Ulan Ude and Kazan have delivered over 10,000 of these 30-seaters.

Above: The seven airborne divisions form the elite of the Soviet ground forces. Stationed within the USSR proper, they form the spearhead of Soviet assault philosophy. Deploying by air from their home bases, the divisions can operate in several fashions, ranging from small sabotage teams up to independent formations of battalion size operating behind enemy lines. Without the expansion of Soviet air transport aviation, such operations would be impossible.

Below: Most of the twin-gun (NR-23 cannon) tail turrets used by the Soviet air forces are of the mass-produced K-series by the Ilyushin bureau. Here the aircraft is also of Ilyushin design. Airborne infantry are not a common load for the Il-76M heavy cargo aircraft of the VVS-VTA.



USSR

Ilyushin Il-76 'Candid'

The Ilyushin Il-76T and TD are among the world's best airlifters for use from rough airstrips. Here three of Aeroflot's 100-odd Il-76TDs are seen at an Afghan airfield, with an An-22 Antei in the rear (and an air force Mil Mi-8 in dark olive green livery). Note the Ilyushin's anhedral.

Now in widespread service with the Soviet V-TA, the **Ilyushin Il-76 'Candid'** is intended to perform duties similar to those of the Lockheed C-141 StarLifter, to which it bears more than a passing resemblance. Like the earlier An-22, the Il-76 was designed to meet joint civil and military requirements, design being initiated in the late 1960s, the resulting aircraft flying for the first time in March 1971 and making its Western debut barely two months later when it appeared at the Paris air show in June.

Unique in being the first Soviet transport aircraft to employ podded jet engines, one of the key criteria of the new transport was the ability to operate from the same short and semi-prepared strips used by its predecessor, the An-12. Accordingly, the wing features numerous high-lift devices such as slats, triple-slotted trailing-edge flaps and spoilers. Field performance is by all accounts impressive, making the **Il-76M** military version suitable for tactical applications but in its latest form the type is equally adept in the strategic role, being able to carry a quite respectable 35000-kg (77,160-lb) payload over some 6400 km (3,975 miles). Alternatively, the 'Candid' can airlift up to 140 paratroops.

Early production specimens were apparently rather more limited with regard to range, conforming closely to the original specification which stipulated the ability to airlift a 40000-kg (88,183-lb) cargo load some 5000 km (3,105 miles), but in 1977 production switched to the **Il-76T** which carries roughly 20 per cent more fuel, and this variant is still being manufactured at the time of writing, deliveries to VTA units reportedly running at a rate of about 30 per year.

Like many earlier Soviet transport aircraft, the 'Candid' also features provision for defensive armament in a manned tail turret, a radar-directed 23-mm twin cannon installation having been seen on a number of aircraft although it is apparently not always fitted.

Specification

Ilyushin Il-76M 'Candid'

Type: strategic/tactical transport aircraft

Powerplant: four 12000-kg (26,455-lb) thrust Soloviev D-30KP turbofans

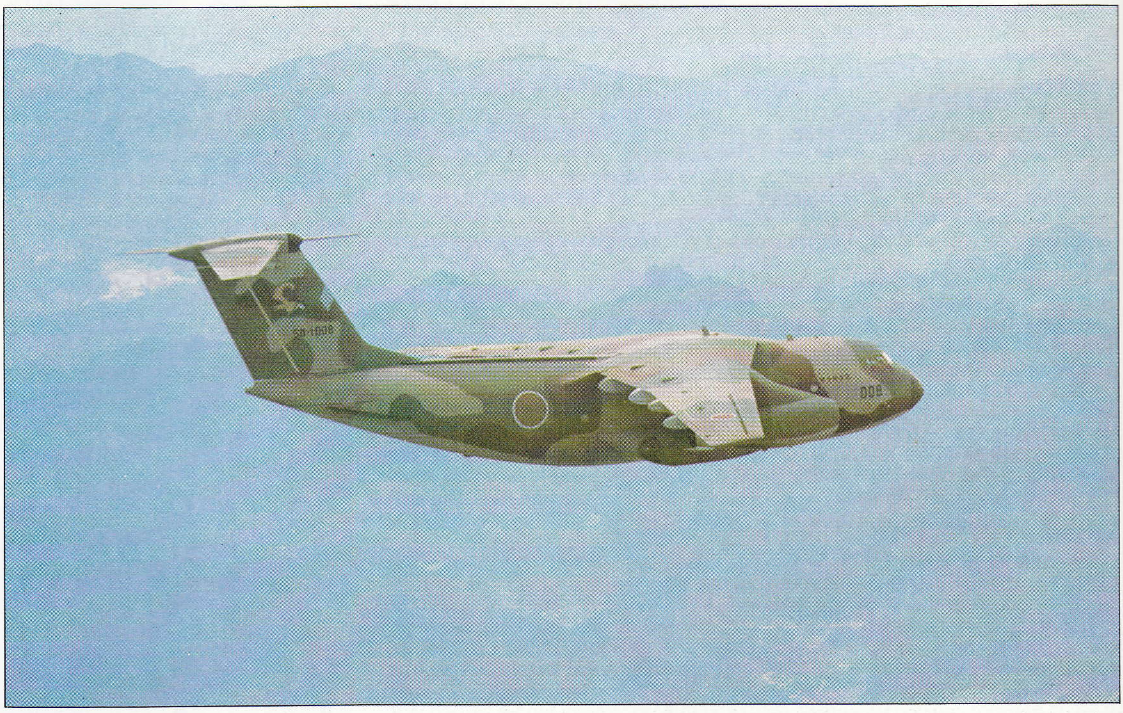
Performance: normal cruising speed 800 km/h (497 mph); service ceiling about 12800 m (41,995 ft); range 6400 km (3,975 miles) with 35000-kg (77,160-lb) payload

Weights: empty 75000 kg (165,344 lb); maximum take-off 170000 kg (374,785 lb)

Dimensions: span 50.50 m (165 ft 8 in); length 46.59 m (152 ft 10.5 in); height 14.75 m (48 ft 5 in); wing area 300.0 m^2 (3,229 sq ft)

JAPAN

Kawasaki C-1



Though a handy and reliable aircraft, the JASDF's Kawasaki C-1 is very limited in payload and range, and is also relatively slow for a jet. The final five of 27 production C-1s have a long-range fuel tank, but they still do not fly beyond Japan. One C-1 is an EW trials prototype.

Produced in only modest numbers for service with the Japanese Air Self-Defence Force, the **Kawasaki C-1** was one of a handful of indigenous designs which reached fruition during the course of the 1960s and 1970s. Conceived to replace the World War II Curtiss C-46 Commando transport aircraft, the C-1 entered design under the auspices of the Nihon Aeroplane Manufacturing Company (NAMC) during 1966, although the task of assembling this type was eventually undertaken by Kawasaki at its Gifu factory. It was from Gifu that the first of two prototypes made a successful maiden flight on 12 November 1970.

After initial company trials, both prototypes were duly handed over to the Japanese Defence Agency for formal evaluation, a process which was completed in March 1973 and resulted in a production go-ahead for an initial batch of 11 aircraft.

Training of personnel to operate the C-1 got under way in 1974, with deliveries of production aircraft beginning shortly before the end of the same year, initially to No. 402 Squadron at Iruma and subsequently to No. 401 Squadron at Komaki and No. 403 Squadron at Miho.

In service the type has proved to be somewhat limited with regard to payload and range, but some of the final examples feature an extra fuel tank in the wing centre-section. Despite being rather 'short-legged', the C-1 is closely tailored to JASDF needs and can accommodate up to 60 troops in a pressurized cabin. Alternatively, when being used for paratrooping, it can take up to 45 fully equipped soldiers. Other loads include 36 stretchers and medical attendants in casualty evacuation tasks, whilst the cabin cross section permits carriage of such items as a 2½-ton truck or a 105-mm howitzer in a freight load of 11900 kg (26,235 lb).

In addition to the basic transport model, design studies of specialized variants for inflight-refuelling, electronic warfare and weather reconnaissance have been undertaken, but have failed to result in firm orders.

Specification

Kawasaki C-1

Type: medium-range tactical transport aircraft

Powerplant: two 6577-kg (14,500-lb) thrust Mitsubishi-built Pratt & Whitney JT8D-M-9 turbofans

Performance: cruising speed 655 km/h (407 mph) at 10670 m (35,000 ft); service ceiling 11580 m (38,000 ft); range 1300 km (808 miles) with a 7900-kg (17,416-lb) payload

Weights: empty 24300 kg (53,571 lb); maximum take-off 45000 kg (99,206 lb)

Dimensions: span 30.60 m (100 ft 4.75 in); length 29.00 m (95 ft 1.75 in); height 9.99 m (32 ft 9.25 in); wing area 120.5 m^2 (1,297.1 sq ft)

ITALY

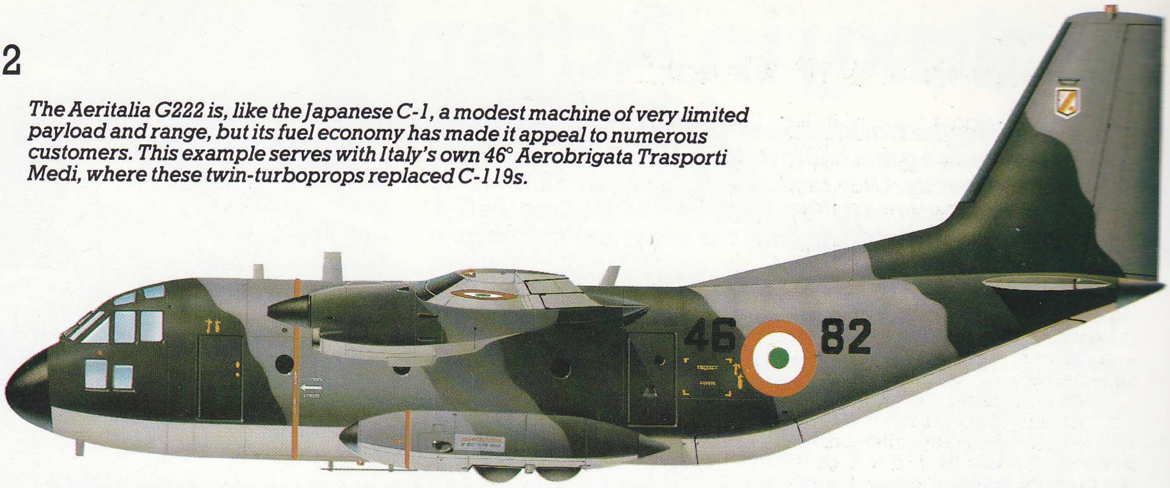
Aeritalia G222

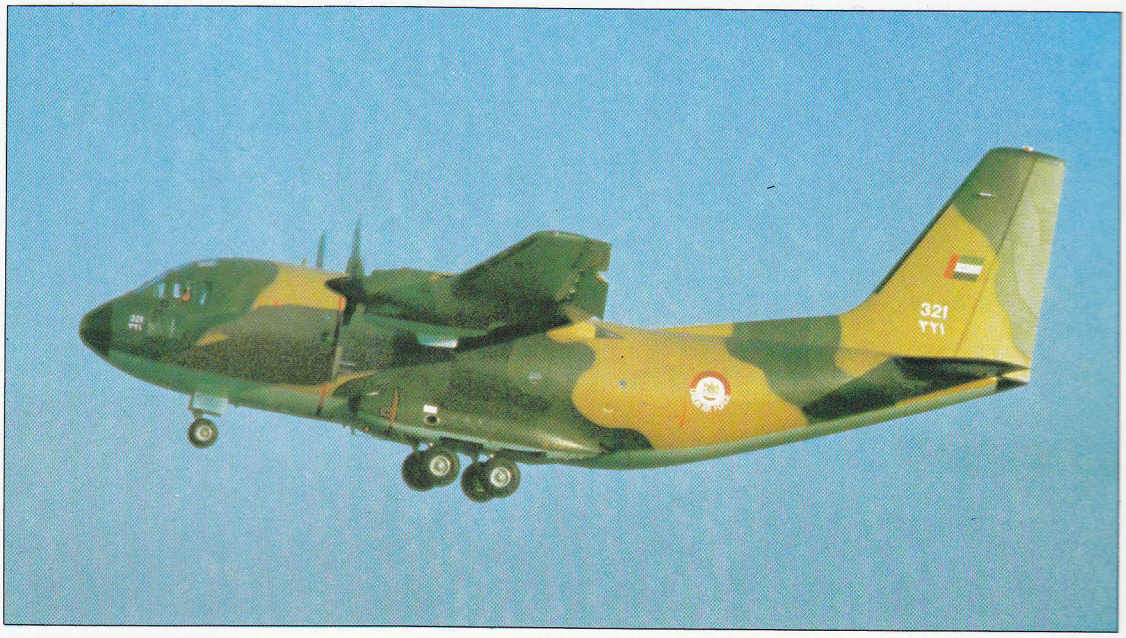
Before experiencing one of the most protracted development periods of recent times, the **Aeritalia G222** tactical transport could in fact be traced back to a 1962 NATO requirement for a V/STOL type. In the event, none of the several proposals conceived at that time came to fruition, but the **Fiat G222** project was sufficiently promising to secure additional Italian air force funding for continued development, albeit in more conventional form. Even then, it was not until 1968 that the go-ahead was given to cut metal on a pair of prototypes and a static test specimen, but further vacillation followed, this largely arising from fluctuations in official policy and delays in funding, whilst the take-over of the parent company certainly did not help to speed matters.

All of these difficulties conspired to slow progress on the first prototype, and it was not until 18 July 1970 that this made its maiden flight. Subsequent testing of this and the second example led to an order for 44 production G222s in August 1972, but further redesign to incorporate more powerful engines followed before the production prototype first flew on 23 December 1975. By then, Argentina had also placed a contract for the type and delivery of production aircraft to the Italian air force began fairly soon afterwards, these supplementing the Lockheed C-130H Hercules on transport tasks. Other customers for the basic T64-powered model include Dubai and Somalia. The freight payload is 9000 kg (19,841 lb), with 53 troops or 44 paratroops as an alternative.

More recently, the G222 has been available with either Allison T56 or Rolls-Royce Tyne engines, Libya's air force currently receiving 20 aircraft powered by the latter, whilst Aeritalia has also undertaken studies into adopting the type for a number of other duties such as maritime patrol/anti-submarine warfare; drone launch and control; surveillance; and radio and radar calibration. A prototype of the last proposal has flown, this being designated **G222RM**, whilst the **G222VS** which took to the air for the first time in March 1978 is intended specifically for electronic countermeasures.

The Aeritalia G222 is, like the Japanese C-1, a modest machine of very limited payload and range, but its fuel economy has made it appeal to numerous customers. This example serves with Italy's own 46° Aerobrigata Trasporti Medi, where these twin-turboprops replaced C-119s.





One of the first export customers for the Aeritalia G222 was Dubai, one of the United Arab Emirates, this machine being delivered in November 1976. Biggest export order came from Libya, whose aircraft have Rolls-Royce Tyne Mk 801 engines giving a higher performance.

Specification
Aeritalia G222
Type: tactical transport aircraft
Powerplant: two 3,400-shp (2535-kW) Fiat-built General Electric T64-GE-P4D turboprops
Performance: cruising speed 439 km/h (273 mph) at 6000 m (19,685 ft); service ceiling 7620 m (25,000 ft); range 1370 km (851 miles) with maximum 9000-kg (19,841-lb) payload
Weights: empty 15400 kg (33,950 lb); maximum take-off 28000 kg (61,728 lb)
Dimensions: span 28.70 m (94 ft 2 in); length 22.70 m (74 ft 5.5 in); height 9.80 m (32 ft 1.75 in); wing area 82.00 m^2 (882.6 sq ft)

USA

Lockheed C-5 Galaxy

Recently reinstated in production for the Military Airlift Command, the truly massive **Lockheed C-5 Galaxy** is the largest military cargo aircraft in service in the West, and plays an important part in the projection of US power on a global basis.

Development of the C-5 can be traced back to 1963 when MAC's forerunner (the Military Air Transport Service) began to consider the acquisition of an extremely large strategic freighter aircraft. Initially, this was known as the CX-4 and early proposals called for a maximum take-off weight of the order of 272160 kg (600,000 lb). Progressive refinement of the concept led to the CX-HLS specification which centred around the ability to carry a 56700-kg (125,000-lb) payload some 12875 km (8,000 miles). Proposals were invited from industry in May 1964, and of the three submissions deemed worthy of further study (from Boeing, Douglas and Lockheed), the last company's entry was eventually adjudged most suitable in the autumn of 1965.

Work on assembly of the first Galaxy got under way in the following summer and this eventually made its maiden flight on 30 June 1968, deliveries to MAC beginning just under 18 months later, on 17 December 1969. Originally, it had been intended to obtain 115 **C-5A** aircraft, but cost overruns (a problem which plagued the Galaxy most viciously) resulted in procurement being limited to just 81, the last of which was delivered in May 1973. More recently it has been decided to reopen the production line, 50 examples of the improved model **C-5B** being due to join MAC later in the present decade.

In service, the Galaxy has had its fair share of problems, most of which centred around the wing structure which has experienced a high degree of fatigue damage. This eventually led to Lockheed being awarded a contract in 1978 to manufacture new-design wings, and following the successful evaluation of two sets, the remaining 76 examples of the C-5A are now progressively returning to Marietta for fitment of these in order to permit the type to see out its intended 30,000-hour service life.

Capable of carrying virtually the entire range of US Army equipment and possessing the ability to operate from unpaved surfaces, the C-5 has made a vital contribution to MAC capability since it attained operational status in 1970, seeing extensive service in South East Asia during the last three years of the Vietnam conflict and also assisting in the resupply of Israel during the Yom Kippur war of October 1973.

Although most commonly employed in the movement of up to 100228 kg (220,967 lb) of cargo, the C-5 can carry close to 350 fully-equipped troops should the need arise, whilst provision of inflight-refuelling capability means that the Galaxy has virtually eliminated the US dependence on intermediate staging points.

Specification
Lockheed C-5A Galaxy
Type: strategic logistical transport aircraft
Powerplant: four 18598-kg (41,000-lb) thrust General Electric TF39-GE-1C turbofans
Performance: cruising speed 890 km/h (553 mph) at 7620 m (25,000 ft); service ceiling 10360 m (34,000 ft); range 6035 km (3,750 miles) with maximum 100228-kg (220,967-lb) payload
Weights: empty 153285 kg (337,937 lb); maximum take-off 348810 kg (769,000 lb)
Dimensions: span 67.88 m (222 ft 8.5 in); length 75.54 m (247 ft 10 in); height 19.85 m (65 ft 1.5 in); wing area 576.0 m^2 (6,200 sq ft)

Galaxy in Action

For many years the world's largest aircraft, the Lockheed C-5 Galaxy has been a great contributor to the US Military Airlift Command capacity. Only the Soviet Union has a comparable aircraft, due to enter service in 1985/6, by which time the C-5 will have been hauling huge amounts of equipment and men for some 15 years.

The green grass of Dover AFB offsets the original pre-1980s white of a USAF Military Airlift Command C-5A, with nose open, and C-141A (since rebuilt as a C-141B). Perspective tends to diminish the enormous difference in size between the two giants from the Lockheed-Georgia Company.

Tipping the scales at a weight which exceeds three-quarters of a million pounds, Lockheed's massive C-5 Galaxy can truly lay claim to being Military Airlift Command's heavyweight and with 50 examples of the new C-5B model set to join the 75 or so surviving C-5As later in the present decade, it is clear that this type will continue to play an important role in US airlift capability for many years to come.

Designed and built by the Lockheed-Georgia Company at Marietta, the Galaxy's career to date has not all been plain sailing, for the type has suffered various setbacks (of both a physical and financial nature) since it first flew. Cost overruns, for instance, caused great embarrassment to the parent company and led to the initial planned quantity of 115 aircraft being cut back to just 81, whilst fatigue damage to the wing structure has accrued at a rather greater rate than anticipated, so that Lockheed is now in the costly and time-consuming process of retrofitting new and improved wings to the entire C-5A fleet so as to ensure that these will be able to last their intended 30,000-hour service life.

Despite these difficulties, the Galaxy is still without equal with regard to airlift capability, its cavernous hold being able to accommodate virtually all equipment currently to be found in the US Army inventory. Perhaps the most startling evidence of its value is provided by the fact that just five aircraft of this type could have satisfactorily fulfilled the entire US contribution to the Berlin Airlift, a task which entailed the use of 130 Douglas C-54 Skymasters.

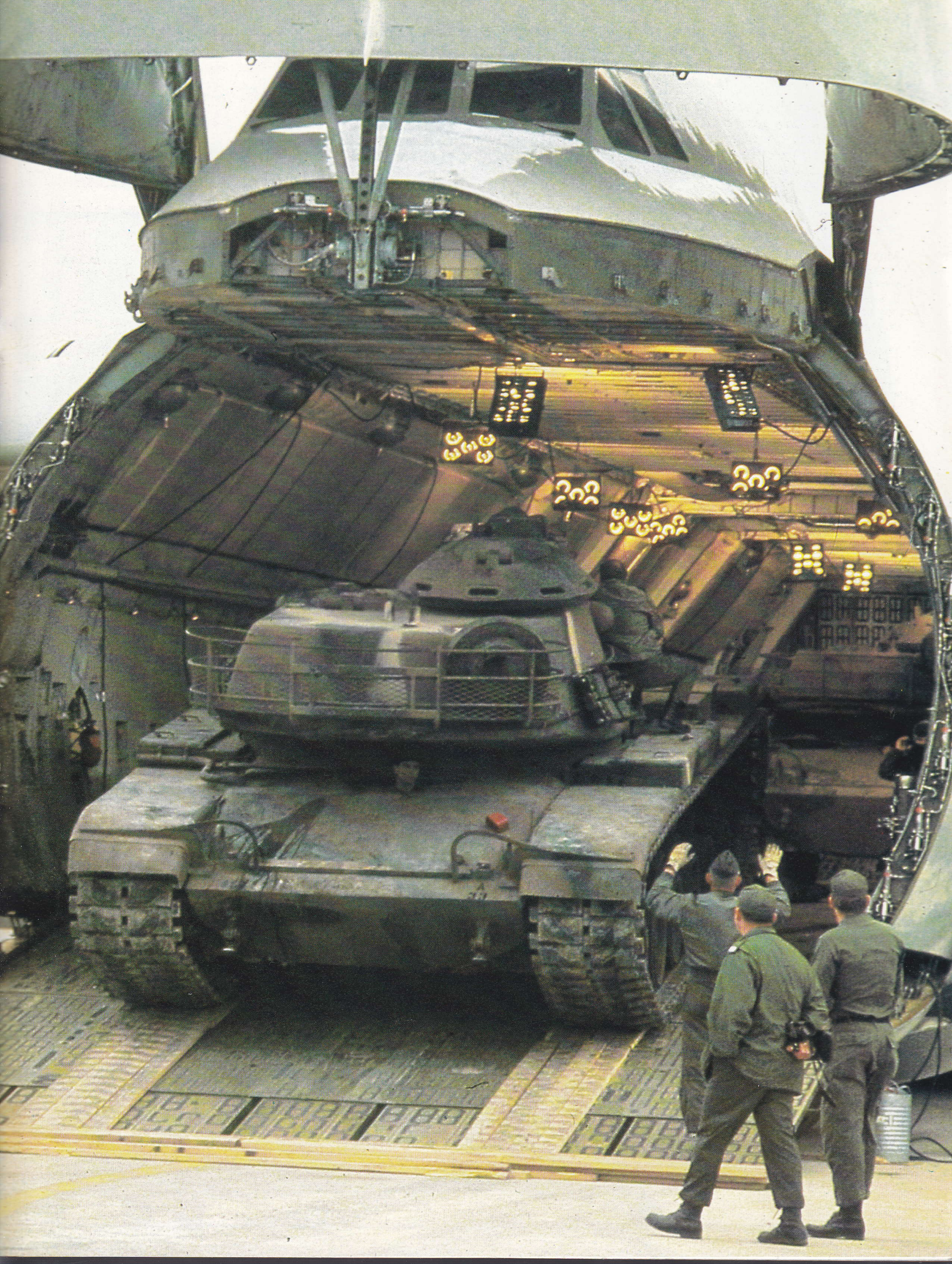
Development of the Galaxy dates from the early 1960s, the initial spur being the US Air Force's SOR-214 requirement which called for a replacement for the Douglas C-133 Cargomaster, then the biggest aircraft in the airlift inventory. Refinement of the somewhat nebulous requirements stipulated at this time led to the appearance of the CX-4 draft specification in 1963. This envisaged an aircraft capable of carrying twice the payload of what was then the new Lockheed C-141 and with a much larger cargo hold cross-section than that of the C-133. Essentially, this meant an aircraft weighing around 272160 kg (600,000 lb), but before any further action was taken the specification was changed, the resulting CX-X concept calling for a lighter aircraft with similar load-carrying capability. In the event further vacillation was the order of the day, yet another specification being issued, but it proved to be a case of third time lucky and this, known as the CX-HLS (Cargo Experimental – Heavy Logistics System) eventually led to the Galaxy. Basically, CX-HLS envisaged an aircraft combining good short- and rough-field performance with the ability to shift a 56700-kg (125,000-lb) payload over distances of up to 12875 km (8,000 miles), or twice that payload over shorter stage lengths.

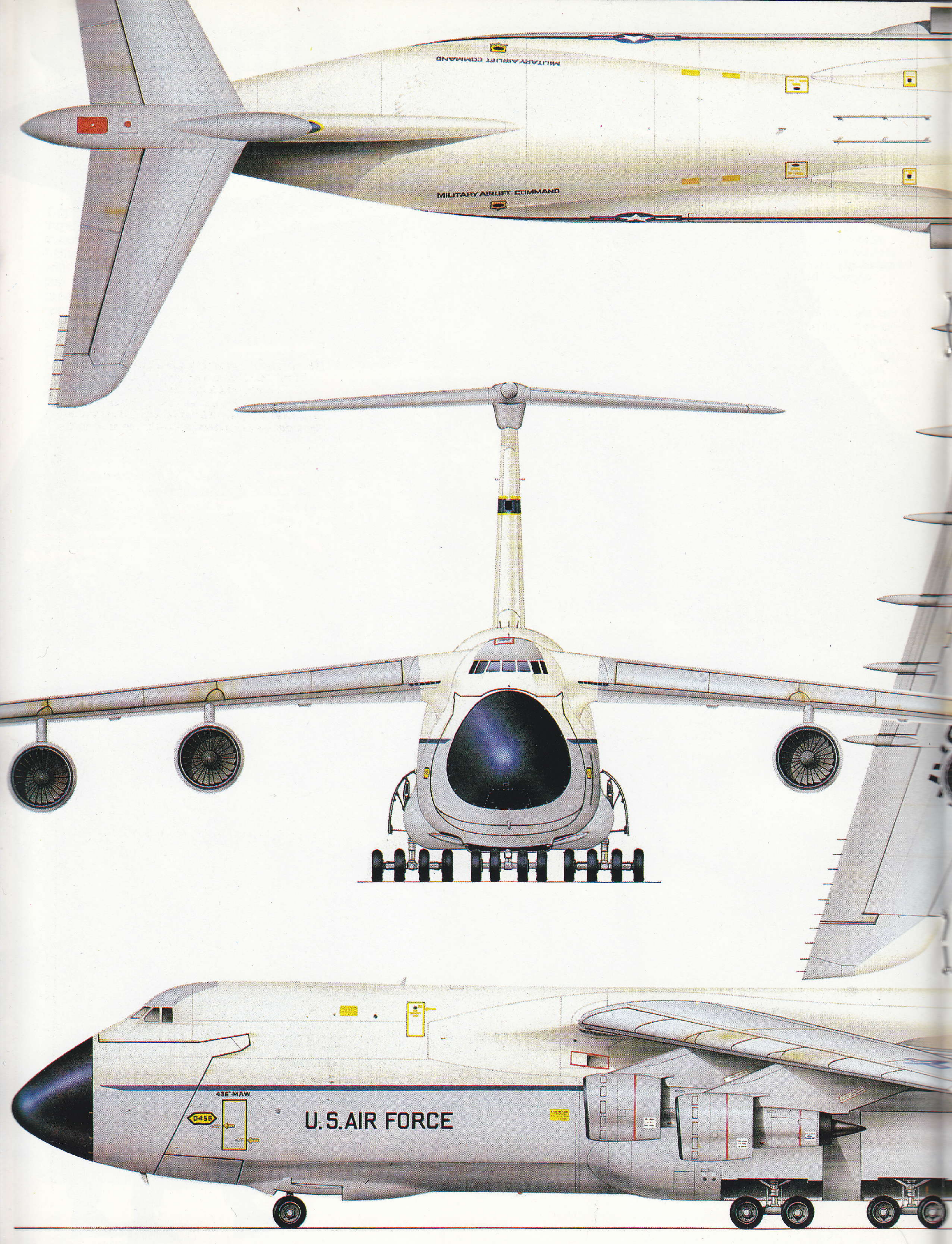
The response from industry was good, several companies submitting tentative proposals to the Air Force Systems Command in May 1964, and three of these (from Boeing, Douglas and Lockheed) received Phase One contracts worth $400,000 in the following month to cover more detailed design studies. Project definition began in earnest in December 1964, and in September 1965 it was announced that Lockheed's GL-500-13-7 submission had been selected and that this manufacturer had been awarded an initial contract for some 58 examples of what henceforth became known as the C-5A. A few months earlier (in July) the General Electric TF39 turbofan engine had been selected to power the new freighter after fighting off a determined challenge from Pratt and Whitney's JTF14E.

Securing the contract for the Galaxy was, of course, merely the first hurdle in bringing the project to successful fruition and Lockheed now began to face the realities of producing what would become the world's largest air-

Right: The heaviest normal load for a C-5A is the M60 battle tank (now at last being replaced by the M1 Abrams), two of which can be carried. The huge nose, complete with radar, is opened by a central hydraulic drive motor.

A recent photograph showing a re-winged Galaxy of the 60th Military Airlift wing based at Travis AFB, flying over the California coastal area near San Francisco. Over the next two years all C-5As will be re-winged and repainted in this European-1 combat camouflage. C-5Bs will look similar.

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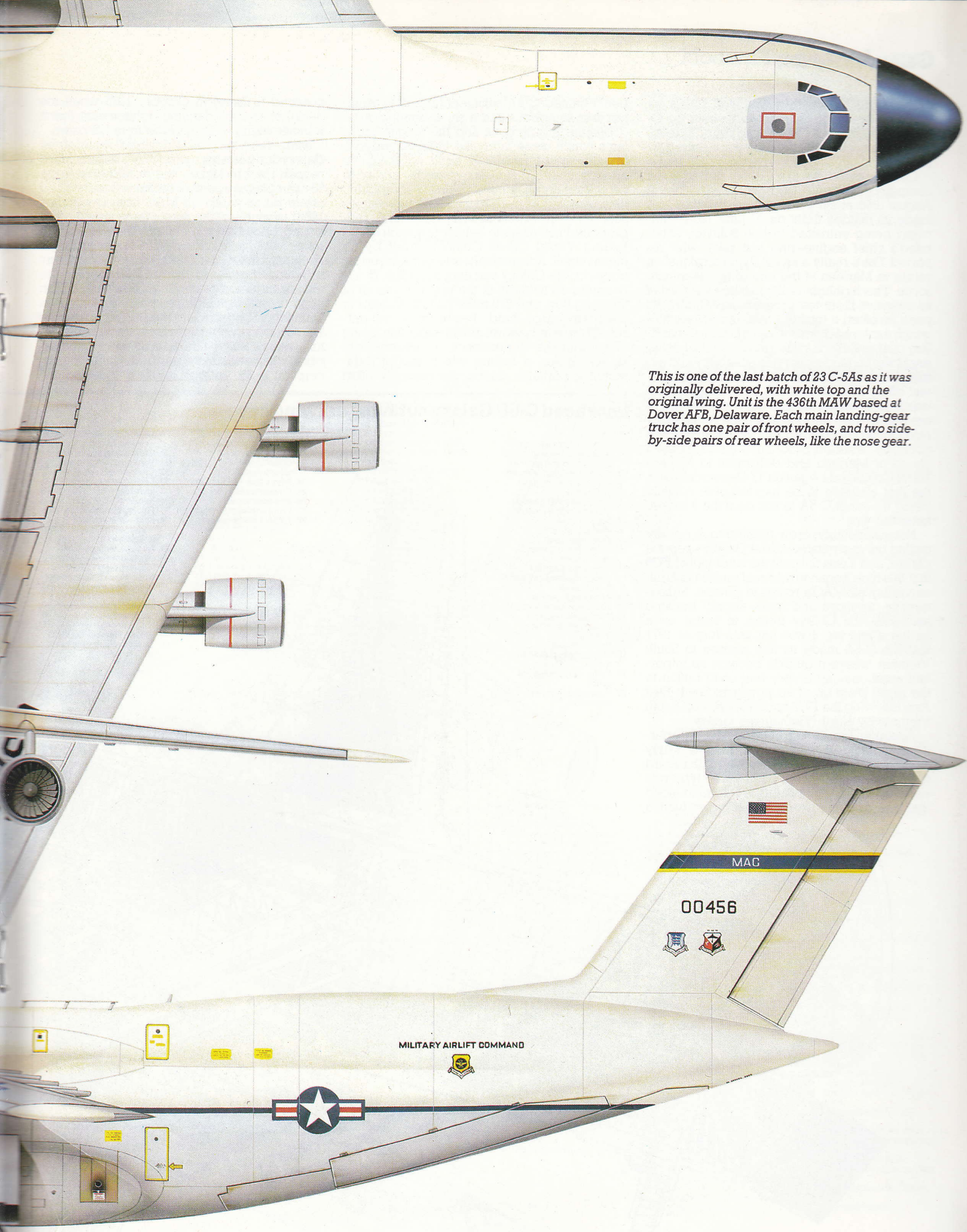

MAC
00456
MILITARY AIRLIFT COMMAND

This is one of the last batch of 23 C-5As as it was originally delivered, with white top and the original wing. Unit is the 436th MAW based at Dover AFB, Delaware. Each main landing-gear truck has one pair of front wheels, and two side-by-side pairs of rear wheels, like the nose gear.

craft, a task for which it was well suited by virtue of its accomplishments with both the C-130 Hercules and C-141 StarLifter. Indeed, many features of the latter type were shared by the C-5A.

Construction of the first Galaxy started at the company's Marietta, Georgia, factory during August 1966, and it was from here that the C-5A made its maiden flight on 30 June 1968, command being entrusted to Leo Sullivan, Lockheed's chief engineering test pilot, who reported 'She's really a sweet flying airplane' on return to Marietta at the end of the 94-minute sortie. This highlight really marked the start of an intensive flight-test programme, which at its peak involved a total of eight aircraft, each of which explored different aspects such as handling characteristics, performance, aerial delivery systems, fatigue, service suitability and extreme climatic variations. Much of the flight-test effort was, as is usual, centred upon Edwards AFB, California, and the whole programme was carried through at a pace remarkably rapid for so large an aircraft. Whilst all this was going on, work on production aircraft forged ahead at Marietta and deliveries to Military Airlift Command began on 17 December 1969, the first example to be handed over actually being the ninth C-5A to roll from the Marietta assembly line.

Not surprisingly, crew training took priority during the early stages of the Galaxy's service career, and it was not until the latter half of 1970 that this type began to add real muscle to airlift capability on MAC's routes to Europe. Subsequently, as more and more aircraft became available, the Galaxy began to range even farther afield but it was not until August 1971 that the C-5A made its first mission to South Vietnam, where it quickly became an important asset, making a very real contribution to the rapid build-up of air power in South East Asia following the 1972 spring invasion of South Vietnam by North Vietnamese forces.

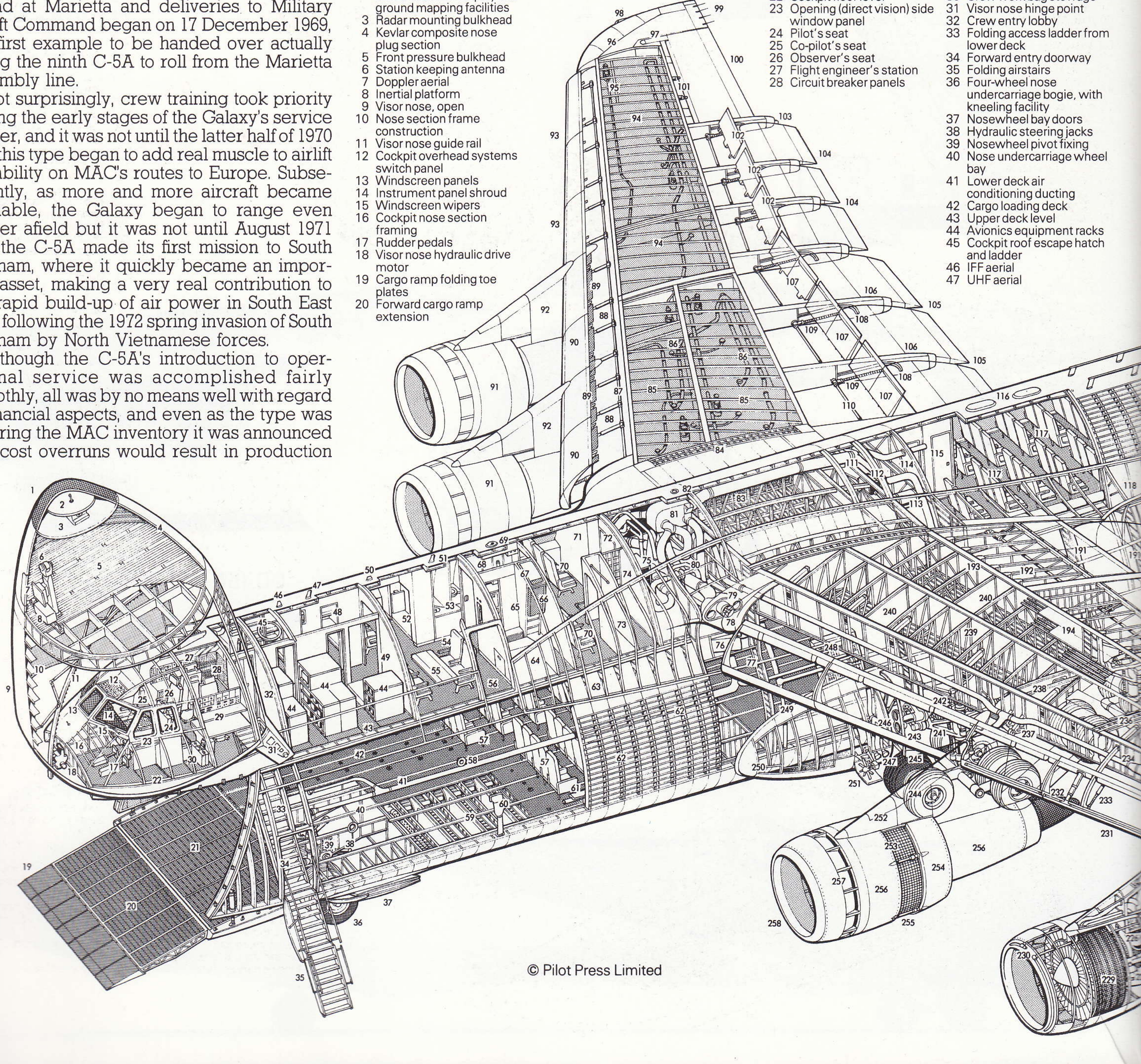
Although the C-5A's introduction to operational service was accomplished fairly smoothly, all was by no means well with regard to financial aspects, and even as the type was entering the MAC inventory it was announced that cost overruns would result in production being limited to 81, sufficient aircraft to equip just four squadrons and a small training unit.

Despite this setback and the fatigue problems which came later, the C-5A provided a massive boost to MAC's airlift potential. As already noted, the Galaxy has the ability to carry virtually all items of US Army equipment, these ranging from armoured fighting vehicles such as personnel carriers, tanks and self-propelled howitzers to helicopters such as the Boeing Vertol CH-47 Chinook, itself by no means small. Alternatively, when employed for trooping, the Galaxy can accommodate 75 fully-equipped soldiers in the upper cabin aft of the wing box, plus 275 more palletized seats in the main cargo hold. Provision of inflight-refuelling gear bestows global capability, doing away with the dependence on intermediate staging bases, a feature which was of paramount importance during the resupply effort mounted to Israel in October 1973 when the denial of en-route landing rights meant that it was necessary to fly nonstop from US bases.

More recently, the undoubted value of the Galaxy has been recognized by the decision to reopen the production line at Marietta. Some 50 examples of a new model known as the C-5B are to be acquired by MAC from December 1985, assembly of the first of these new aircraft having begun only recently. The proposal to restart C-5 production in fact originated from Lockheed in October 1981, when the company submitted figures to the USAF covering the manufacture and assembly of 50 aircraft. With airlift potential giving rise to very real concern within the Congress and the US Department of Defense, this suggestion came at a most opportune moment and Lockheed-Georgia's enterprise was rewarded a year later with the receipt of a $50 million contract covering the

Lockheed C-5B Galaxy cutaway drawing key

1 Radome
2 Multi-mode radar scanner: colour weather display and ground mapping facilities
3 Radar mounting bulkhead
4 Kevlar composite nose plug section
5 Front pressure bulkhead
6 Station keeping antenna
7 Doppler aerial
8 Inertial platform
9 Visor nose, open
10 Nose section frame construction
11 Visor nose guide rail
12 Cockpit overhead systems switch panel
13 Windscreen panels
14 Instrument panel shroud
15 Windscreen wipers
16 Cockpit nose section framing
17 Rudder pedals
18 Visor nose hydraulic drive motor
19 Cargo ramp folding toe plates
20 Forward cargo ramp extension
21 Forward cargo loading ramp
22 Cockpit floor level
23 Opening (direct vision) side window panel
24 Pilot's seat
25 Co-pilot's seat
26 Observer's seat
27 Flight engineer's station
28 Circuit breaker panels
29 Navigator's station (special missions use only)
30 Crew work bag stowage
31 Visor nose hinge point
32 Crew entry lobby
33 Folding access ladder from lower deck
34 Forward entry doorway
35 Folding airstairs
36 Four-wheel nose undercarriage bogie, with kneeling facility
37 Nosewheel bay doors
38 Hydraulic steering jacks
39 Nosewheel pivot fixing
40 Nose undercarriage wheel bay
41 Lower deck air conditioning ducting
42 Cargo loading deck
43 Upper deck level
44 Avionics equipment racks
45 Cockpit roof escape hatch and ladder
46 IFF aerial
47 UHF aerial



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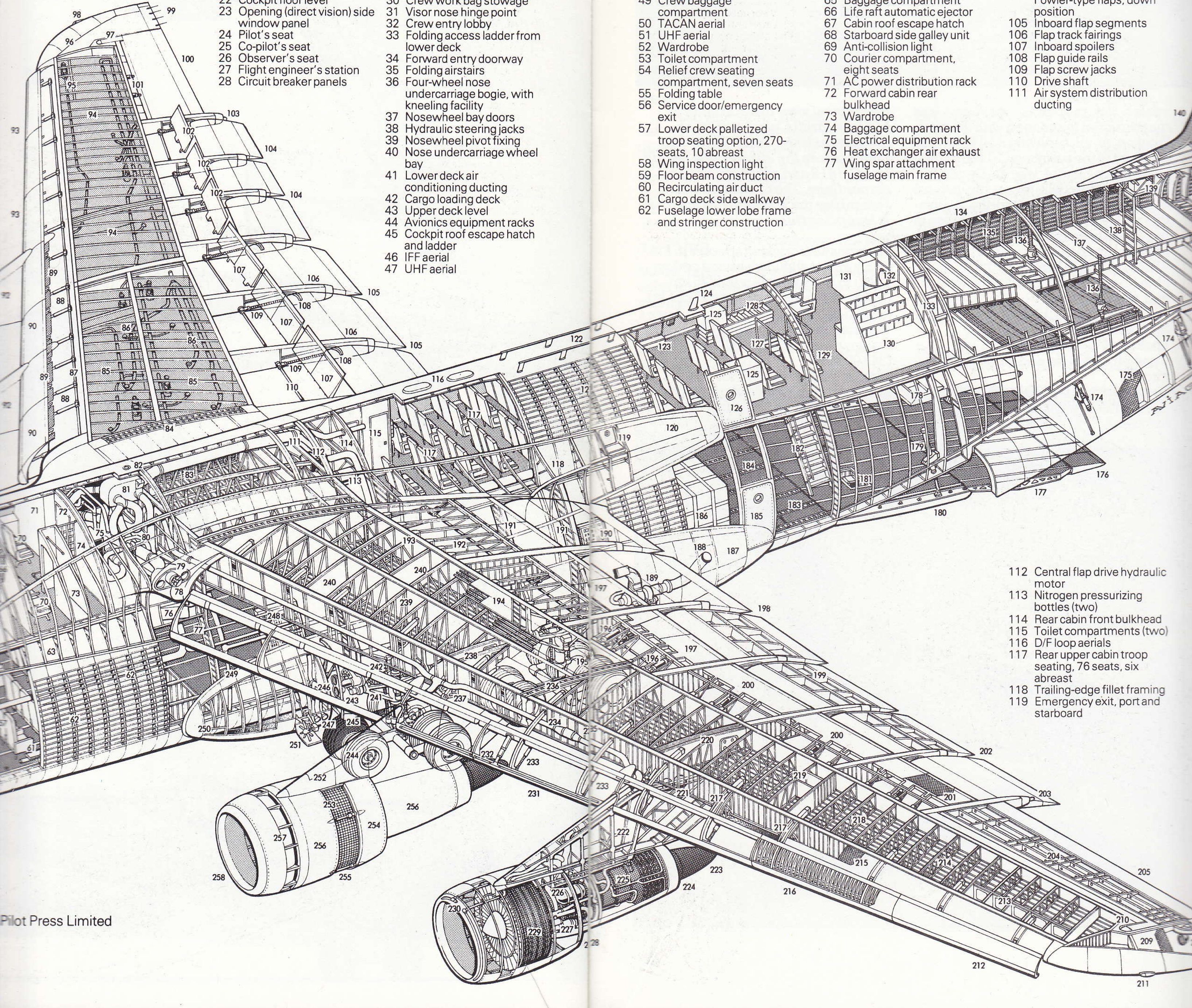
On the very last day of 1982, this was followed by a full production contract for a batch of 50 aircraft, fabrication of parts for these beginning at Marietta in the autumn of 1983.

Essentially identical in appearance to the original variant, the C-5B will incorporate the revised wing structure which is now being fitted to the C-5A fleet, as well as improved General Electric TF39-GE-1C engines, modern avionics gear and certain other improvements intended to offer greater resistance to corrosion and limit the likelihood of fractures.

When they begin to join the existing C-5As at the end of 1985, the new C-5Bs will significantly enhance MAC's already impressive capability, and should ensure that this command will be able to meet its strategic airlift obligations for the remainder of this century.

Galaxy cutaway drawing key

21 Forward cargo loading ramp
22 Cockpit floor level
23 Opening (direct vision) side window panel
24 Pilot's seat
25 Co-pilot's seat
26 Observer's seat
27 Flight engineer's station
28 Circuit breaker panels
29 Navigator's station (special missions use only)
30 Crew work bag stowage
31 Visor nose hinge point
32 Crew entry lobby
33 Folding access ladder from lower deck
34 Forward entry doorway
35 Folding airstairs
36 Four-wheel nose undercarriage bogie, with kneeling facility
37 Nosewheel bay doors
38 Hydraulic steering jacks
39 Nosewheel pivot fixing
40 Nose undercarriage wheel bay
41 Lower deck air conditioning ducting
42 Cargo loading deck
43 Upper deck level
44 Avionics equipment racks
45 Cockpit roof escape hatch and ladder
46 IFF aerial
47 UHF aerial
48 Relief crew rest area, six bunks
49 Crew baggage compartment
50 TACAN aerial
51 UHF aerial
52 Wardrobe
53 Toilet compartment
54 Relief crew seating compartment, seven seats
55 Folding table
56 Service door/emergency exit
57 Lower deck palletized troop seating option, 270-seats, 10 abreast
58 Wing inspection light
59 Floor beam construction
60 Recirculating air duct
61 Cargo deck side walkway
62 Fuselage lower lobe frame and stringer construction
63 Wing root fillet framing
64 Escape slide stowage
65 Baggage compartment
66 Life raft automatic ejector
67 Cabin roof escape hatch
68 Starboard side galley unit
69 Anti-collision light
70 Courier compartment, eight seats
71 AC power distribution rack
72 Forward cabin rear bulkhead
73 Wardrobe
74 Baggage compartment
75 Electrical equipment rack
76 Heat exchanger air exhaust
77 Wing spar attachment fuselage main frame
78 Ground cooling fan
79 Air system intake plenum
80 Air conditioning plant
81 Conditioned air distribution box
82 Upper fuselage light
83 Wing centre section construction
84 Wing panel bolted joint
85 Inboard wing integral fuel tanks
86 Fuel system piping
87 Leading-edge slat drive shaft
88 Slat screw jacks
89 Inboard slat aerodynamic seals
90 Inboard leading edge slat segments, open
91 Starboard engine nacelles
92 Nacelle pylons
93 Outboard leading edge slat segments, open
94 Outer wing panel integral fuel tanks; total system capacity 50,850 US gal (192490 litres)
95 Surge tank
96 Wing tip fairing
97 Aileron mass balance
98 Starboard navigation light
99 Static dischargers
100 Starboard aileron
101 Aileron hydraulic actuators
102 Outboard spoilers, open
103 Fuel jettison
104 Outboard single-slotted Fowler-type flaps, down position
105 Inboard flap segments
106 Flap track fairings
107 Inboard spoilers
108 Flap guide rails
109 Flap screw jacks
110 Drive shaft
111 Air system distribution ducting
112 Central flap drive hydraulic motor
113 Nitrogen pressurizing bottles (two)
114 Rear cabin front bulkhead
115 Toilet compartments (two)
116 D/F loop aerials
117 Rear upper cabin troop seating, 76 seats, six abreast
118 Trailing-edge fillet framing
119 Emergency exit, port and starboard



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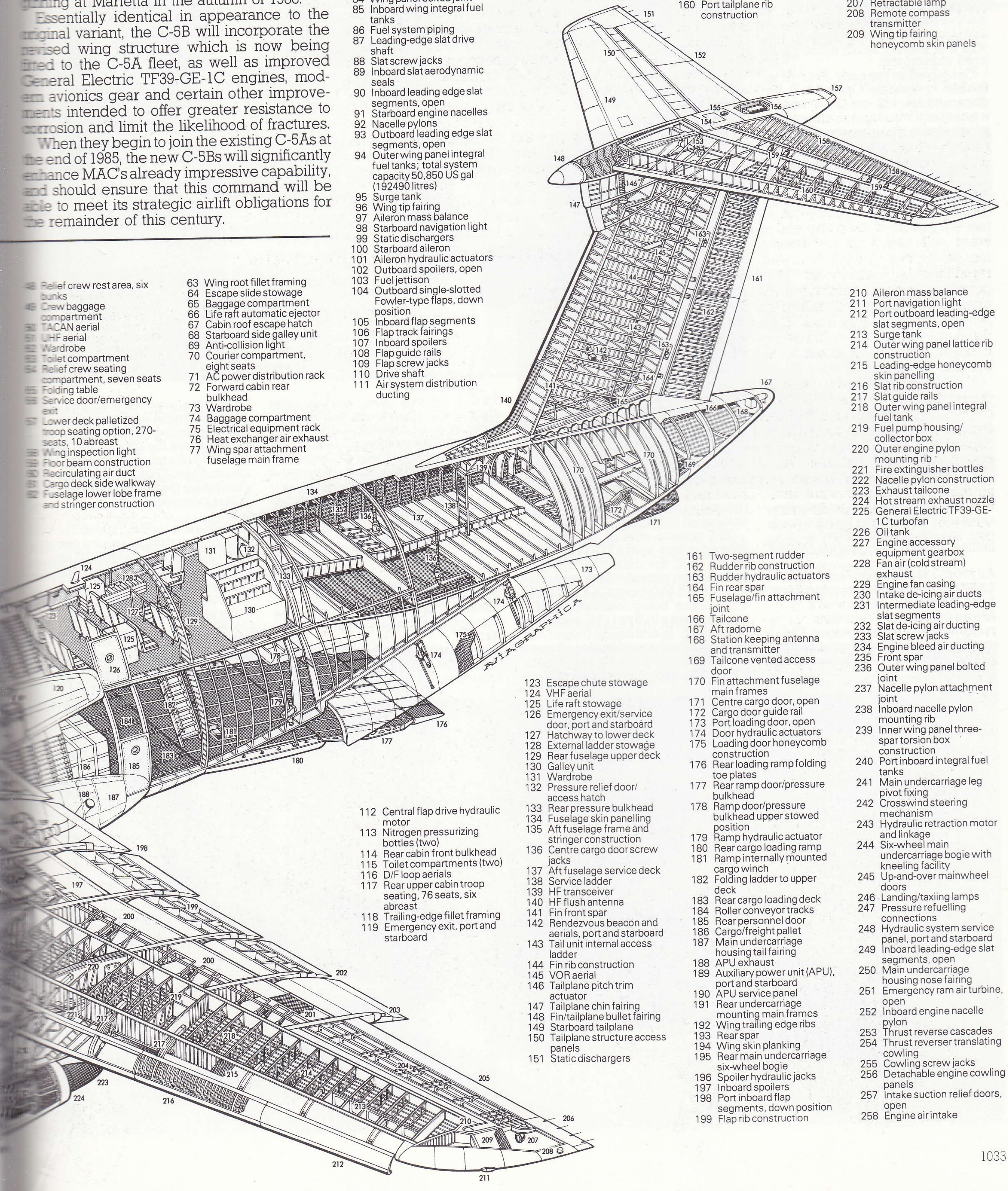

48 Relief crew rest area, six bunks
49 Crew baggage compartment
50 TACAN aerial
51 UHF aerial
52 Wardrobe
53 Toilet compartment
54 Relief crew seating compartment, seven seats
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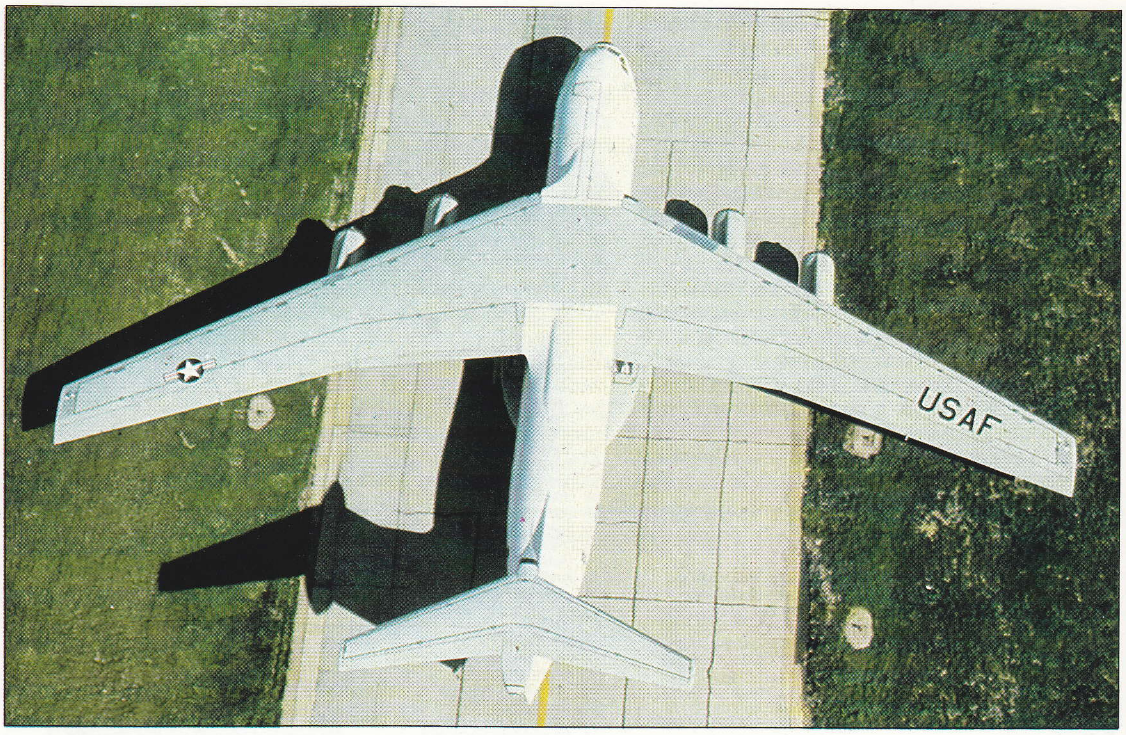
61 Cargo deck side walkway
62 Fuselage lower lobe frame and stringer construction
63 Wing root fillet framing
64 Escape slide stowage
65 Baggage compartment
66 Life raft automatic ejector
67 Cabin roof escape hatch
68 Starboard side galley unit
69 Anti-collision light
70 Courier compartment, eight seats
71 AC power distribution rack
72 Forward cabin rear bulkhead
73 Wardrobe
74 Baggage compartment
75 Electrical equipment rack
76 Heat exchanger air exhaust
77 Wing spar attachment fuselage main frame
78 Ground cooling fan
79 Air system intake plenum
80 Air conditioning plant
81 Conditioned air distribution box
82 Upper fuselage light
83 Wing centre section construction
84 Wing panel bolted joint
85 Inboard wing integral fuel tanks
86 Fuel system piping
87 Leading-edge slat drive shaft
88 Slat screw jacks
89 Inboard slat aerodynamic seals
90 Inboard leading edge slat segments, open
91 Starboard engine nacelles
92 Nacelle pylons
93 Outboard leading edge slat segments, open
94 Outer wing panel integral fuel tanks; total system capacity 50,850 US gal (192490 litres)
95 Surge tank
96 Wing tip fairing
97 Aileron mass balance
98 Starboard navigation light
99 Static dischargers
100 Starboard aileron
101 Aileron hydraulic actuators
102 Outboard spoilers, open
103 Fuel jettison
104 Outboard single-slotted Fowler-type flaps, down position
105 Inboard flap segments
106 Flap track fairings
107 Inboard spoilers
108 Flap guide rails
109 Flap screw jacks
110 Drive shaft
111 Air system distribution ducting
112 Central flap drive hydraulic motor
113 Nitrogen pressurizing bottles (two)
114 Rear cabin front bulkhead
115 Toilet compartments (two)
116 D/F loop aerials
117 Rear upper cabin troop seating, 76 seats, six abreast
118 Trailing-edge fillet framing
119 Emergency exit, port and starboard
120 Wing root trailing-edge fillet
121 Fuselage upper lobe frame and stringer construction
122 ADF sense 'towel rail' aerials
123 Escape chute stowage
124 VHF aerial
125 Life raft stowage
126 Emergency exit/service door, port and starboard
127 Hatchway to lower deck
128 External ladder stowage
129 Rear fuselage upper deck
130 Galley unit
131 Wardrobe
132 Pressure relief door/access hatch
133 Rear pressure bulkhead
134 Fuselage skin panelling
135 Aft fuselage frame and stringer construction
136 Centre cargo door screw jacks
137 Aft fuselage service deck
138 Service ladder
139 HF transceiver
140 HF flush antenna
141 Fin front spar
142 Rendezvous beacon and aerials, port and starboard
143 Tail unit internal access ladder
144 Fin rib construction
145 VOR aerial
146 Tailplane pitch trim actuator
147 Tailplane chin fairing
148 Fin/tailplane bullet fairing
149 Starboard tailplane
150 Tailplane structure access panels
151 Static dischargers
152 Two-segment elevators
153 Tailplane pivot attachment
154 Service access hatch
155 Anti-collision light
156 Air data/crash recorder
157 Tail navigation lights
158 Elevator rib construction
159 Elevator hydraulic actuators
160 Port tailplane rib construction
161 Two-segment rudder
162 Rudder rib construction
163 Rudder hydraulic actuators
164 Fin rear spar
165 Fuselage/fin attachment joint
166 Tailcone
167 Aft radome
168 Station keeping antenna and transmitter
169 Tailcone vented access door
170 Fin attachment fuselage main frames
171 Centre cargo door, open
172 Cargo door guide rail
173 Port loading door, open
174 Door hydraulic actuators
175 Loading door honeycomb construction
176 Rear loading ramp folding toe plates
177 Rear ramp door/pressure bulkhead
178 Ramp door/pressure bulkhead upper stowed position
179 Ramp hydraulic actuator
180 Rear cargo loading ramp
181 Ramp internally mounted cargo winch
182 Folding ladder to upper deck
183 Rear cargo loading deck
184 Roller conveyor tracks
185 Rear personnel door
186 Cargo/freight pallet
187 Main undercarriage housing tail fairing
188 APU exhaust
189 Auxiliary power unit (APU), port and starboard
190 APU service panel
191 Rear undercarriage mounting main frames
192 Wing trailing edge ribs
193 Rear spar
194 Wing skin planking
195 Rear main undercarriage six-wheel bogie
196 Spoiler hydraulic jacks
197 Inboard spoilers
198 Port inboard flap segments, down position
199 Flap rib construction
200 Outboard spoilers
201 Spoiler honeycomb construction
202 Outboard flap segments, down position
203 Port fuel jettison pipe
204 Aileron rib construction
205 Port aileron
206 Static dischargers
207 Retractable lamp
208 Remote compass transmitter
209 Wing tip fairing honeycomb skin panels
210 Aileron mass balance
211 Port navigation light
212 Port outboard leading-edge slat segments, open
213 Surge tank
214 Outer wing panel lattice rib construction
215 Leading-edge honeycomb skin panelling
216 Slat rib construction
217 Slat guide rails
218 Outer wing panel integral fuel tank
219 Fuel pump housing/collector box
220 Outer engine pylon mounting rib
221 Fire extinguisher bottles
222 Nacelle pylon construction
223 Exhaust tailcone
224 Hot stream exhaust nozzle
225 General Electric TF39-GE-1C turbofan
226 Oil tank
227 Engine accessory equipment gearbox
228 Fan air (cold stream) exhaust
229 Engine fan casing
230 Intake de-icing air ducts
231 Intermediate leading-edge slat segments
232 Slat de-icing air ducting
233 Slat screw jacks
234 Engine bleed air ducting
235 Front spar
236 Outer wing panel bolted joint
237 Nacelle pylon attachment joint
238 Inboard nacelle pylon mounting rib
239 Inner wing panel three-spar torsion box construction
240 Port inboard integral fuel tanks
241 Main undercarriage leg pivot fixing
242 Crosswind steering mechanism
243 Hydraulic retraction motor and linkage
244 Six-wheel main undercarriage bogie with kneeling facility
245 Up-and-over mainwheel doors
246 Landing/taxiing lamps
247 Pressure refuelling connections
248 Hydraulic system service panel, port and starboard
249 Inboard leading-edge slat segments, open
250 Main undercarriage housing nose fairing
251 Emergency ram air turbine, open
252 Inboard engine nacelle pylon
253 Thrust reverse cascades
254 Thrust reverser translating cowling
255 Cowling screw jacks
256 Detachable engine cowling panels
257 Intake suction relief doors, open
258 Engine air intake

USA

Lockheed C-141 StarLifter



An unusual view of a StarLifter of Military Airlift Command on an airbase taxiway. This picture was taken before the aircraft was rebuilt as a C-141B and given European-1 camouflage. The C-141 strongly resembles the Soviet Il-76, though it is less powerful.

Although not the first jet-powered strategic cargo aircraft to join the Military Air Transport Service (MATS) inventory, the **Lockheed C-141 StarLifter** was certainly the first such type to be developed from the outset specifically for this command, and in its current 'stretched' guise as the **C-141B** it remains a most important airlift asset today, close to 270 machines serving with five military airlift wings plus a small training unit.

Conceived in the early 1960s in response to Specific Operational Requirement No. 182, the C-141 was the winning entry in a design competition which also included contenders from Boeing, Douglas and General Dynamics. Forming the airlift component of the integrated Logistics Support System 476L, the StarLifter first flew on 17 December 1963, subsequently entering service with the 1501st Air Transport Wing at Travis AFB, California, in the spring of 1965. A total of 284 examples of the initial **C-141A** had been completed for MATS/MAC when production terminated in the late 1960s, one further StarLifter being built by Lockheed to serve as a demonstrator for the unsuccessful **L-300** commercial freighter.

The advent of the C-141A more or less coincided with increased US involvement in Vietnam and the type was quickly introduced to the combat zone, being employed to move troops and equipment across the Pacific to South East Asia as well as ferrying wounded personnel back to the USA for hospital treatment. However, operational experience revealed that airlift potential would benefit significantly from the provision of inflight-refuelling capability, whilst it also became apparent that the type was often 'volume-limited' rather than 'weight-limited' with regard to payload. Although the idea of 'stretching' the type first emerged during the 1960s, nothing was done until mid-1976 when Lockheed received a contract to develop the StarLifter further, a process which basically consisted of inserting two new fuselage sections and installing an inflight-refuelling receptacle and associated plumbing.

The revised aircraft was flown in prototype form as the **YC-141B** during March 1977, the improved layout resulting in an aircraft which was some 7.11 m (23 ft 4 in) longer, a 4.06 m (13 ft 4 in) section being inserted ahead of the wing and a 3.05 m (10 ft) section aft of the wing. In addition, a bulged fairing above the forward fuselage housed inflight-refuelling equipment. Evaluation of the prototype conversion revealed few problems. Lockheed was thus directed to proceed with the modification of all surviving C-141As and delivery of the resulting C-141B variant to MAC got under way in December 1979. By June 1982, when the project ended, MAC had gained the equivalent of 90 extra aircraft at no increase in crew requirements. The C-141B has a maximum payload capability of 41222 kg (90,880 lb), the type being able to accommodate many weapon and vehicle types.

Specification

Lockheed C-141B StarLifter

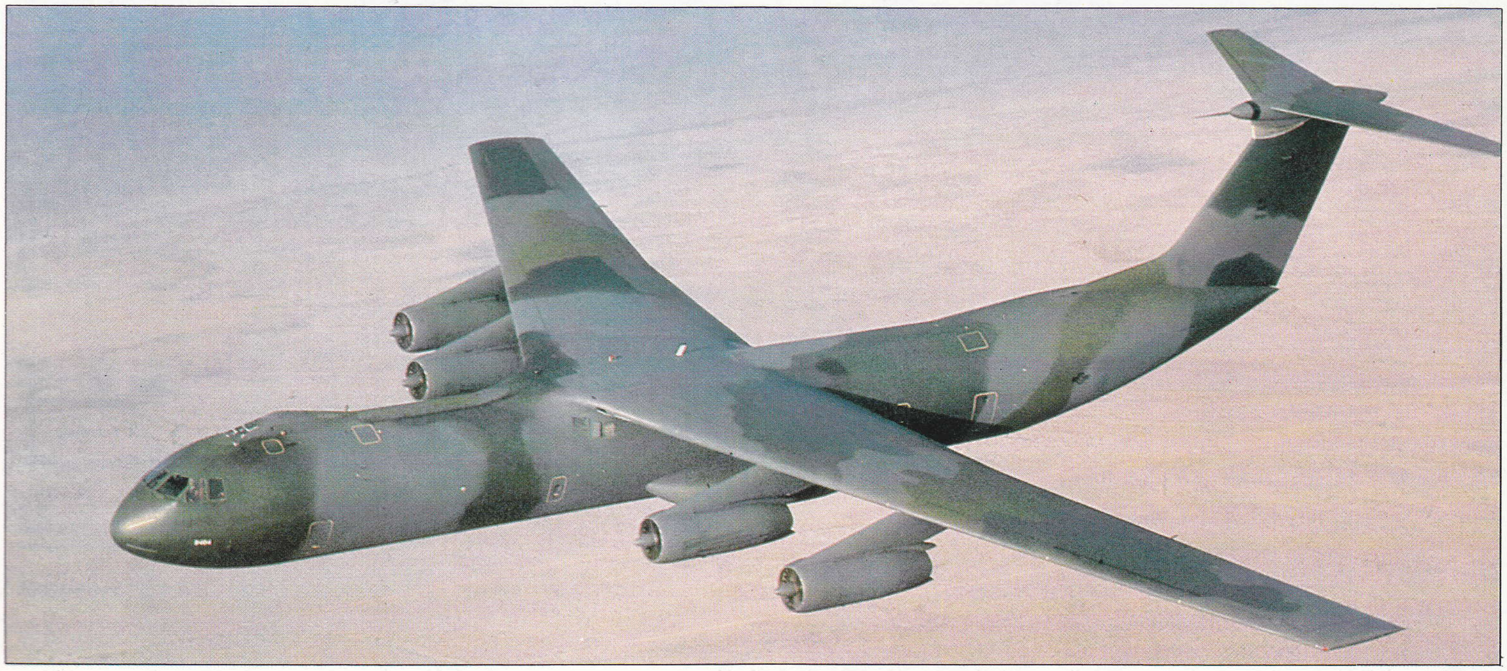
Type: strategic logistical transport aircraft

Powerplant: four 9526-kg (21,000-lb) thrust Pratt & Whitney TF33-P-7 turbofans

Performance: cruising speed 910 km/h (566 mph) at altitude; service ceiling 12680 m (41,600 ft); range 4725 km (2,935 miles) with maximum 41222-kg (90,880-lb) payload

Weights: empty 67186 kg (148,120 lb); maximum take-off 155580 kg (343,000 lb)

Dimensions: span 48.74 m (159 ft 11 in); length 51.29 m (168 ft 3.5 in); height 11.96 m (39 ft 3 in); wing area 299.88 m^2 (3,228 sq ft)

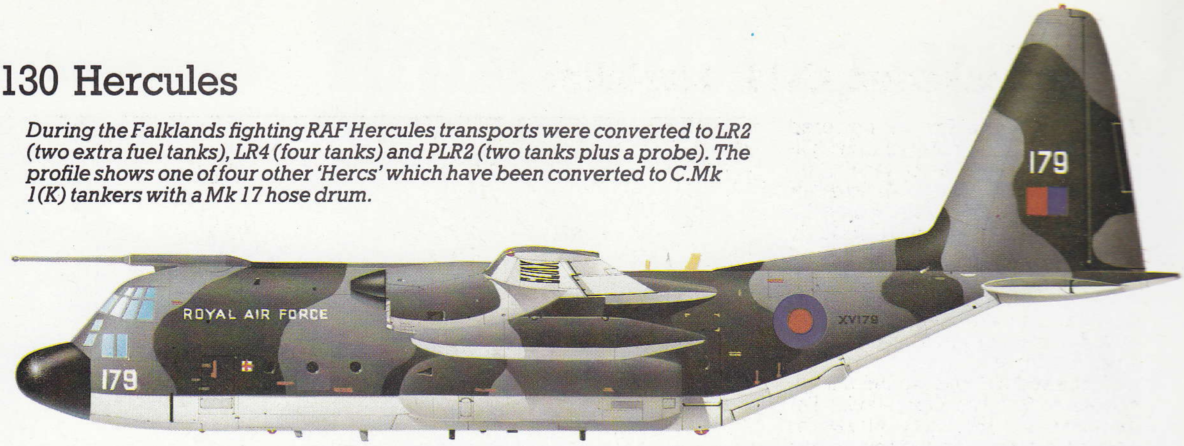


All 270 C-141 StarLifters active in USAF Military Airlift Command have been rebuilt as C-141Bs, with a longer fuselage, air-refuelling receptacle and other changes. The modification had the effect of adding 90 aircraft to MAC, without needing extra crews or fuel.

USA

Lockheed C-130 Hercules

During the Falklands fighting RAF Hercules transports were converted to LR2 (two extra fuel tanks), LR4 (four tanks) and PLR2 (two tanks plus a probe). The profile shows one of four other 'Hercs' which have been converted to C.Mk 1(K) tankers with a Mk 17 hose drum.



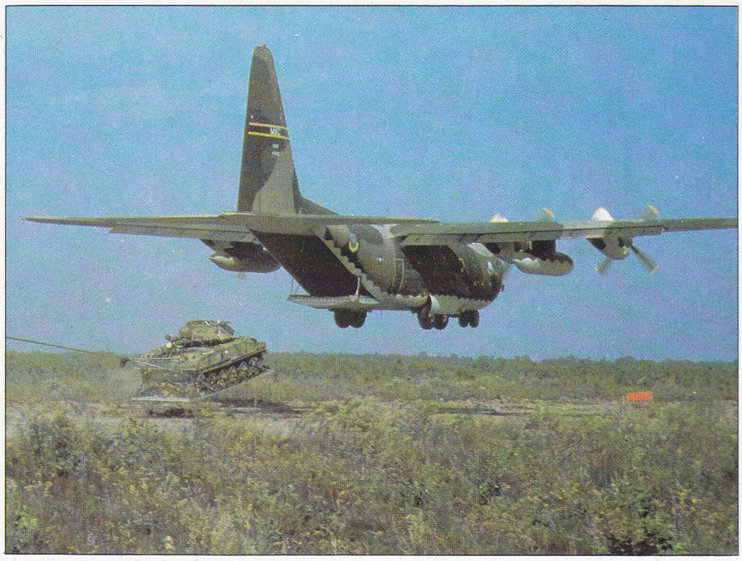
Unquestionably one of the great post-war aviation success stories, the highly versatile **Lockheed C-130 Hercules** has found favour with both civil and military operators. Still in production today, 30 years since it first flew in prototype form, the C-130 has grown in stature as the years have passed, undertaking a host of diverse and demanding missions with seemingly equal facility. From airlift to inflight-refuelling, from reconnaissance to rescue and from gunship to drone controller, the 'Herky Bird' has done it all in the course of a career which has seen it more than live up to its name.

Development of the C-130 series started at the beginning of 1951, when the US Air Force initiated the search for a new tactical transport aircraft, proposals by Boeing, Douglas, Fairchild and Lockheed being submitted in spring of the same year. On 2 July 1951, Lockheed's design was adjudged the winner and rewarded with a contract for a pair of prototypes, the second of which made the type's maiden flight on 23 August 1954. By that time, the first production contracts had been placed by the USAF and delivery of the **C-130A** model to an operational unit began in December 1956, the recipient being the 463rd Troop Carrier Wing at Ardmore AFB, Oklahoma.

Subsequent USAF models included the uprated **C-130B** and extended-range **C-130E** transports as well as the **HC-130** for rescue work, whilst the type was also acquired by the US Marine Corps for inflight-refuelling as the **KC-130F** and by the US Navy which obtained the **C-130F** for pure transport duties and the ski-equipped **LC-130F** for Antarctic exploration support.

Nor was the Hercules slow to secure numerous export orders, and examples of the C-130A, C-130B and C-130E were delivered to several overseas air arms. By far the most successful variant in terms of overseas sales (and, incidentally, the current production model) is the **C-130H**, which flew for the first time in November 1964. Featuring more powerful Allison engines, a redesigned outer wing and other minor improvements, the C-130H and derivatives thereof are at present in service with no less than 40 air arms throughout the world as well as with the US Air Force, US Navy, US Marine Corps and US Coast Guard.

In addition to the basic aircraft, a stretched derivative known as the **C-130H-30** is also available, this offering approximately 37 per cent more cargo capacity: roughly half of the RAF's fleet of **Hercules C.Mk 1** aircraft has been retrospectively updated to similar **Hercules C.Mk 3** standard by Marshalls of Cambridge. The C-130H can carry a 19686-kg (43,400-lb) freight payload, or 92 troops, or 64 paratroops, or 74 litters and two attendants.



LAPES (low-altitude parachute extraction system) can be used for rapid aerial delivery of items as big as this M551 General Sheridan missile-firing light tank.

Specification

Lockheed C-130H Hercules

Type: tactical transport aircraft

Powerplant: four 4,508-ehp (3362-ekW) Allison T56-A-15 turboprops

Performance: cruising speed 556 km/h (345 mph); service ceiling 10060 m (33,000 ft); range 4002 km (2,487 miles) with maximum 19686-kg (43,400-lb) payload

Weights: empty 34358 kg (75,745 lb); maximum take-off 79380 kg (175,000 lb)

Dimensions: span 40.41 m (132 ft 7 in); length 29.79 m (97 ft 9 in); height 11.66 m (38 ft 3 in); wing area 162.12 m^2 (1,745 sq ft)

No military airlift transport has been used under harsher conditions, or in more places, than the C-130. This C-130H of the USAF is making a desert strip take-off, for which the narrow track of 4.35 m (14 ft 3 in) has proved entirely adequate.

Siege of Khe Sanh

The Siege of Khe Sanh could easily have been an American tragedy, another Dien Bien Phu. Under normal circumstances the 6,000 Marines surrounded and outnumbered three or four to one would have stood little chance, isolated and unreinforced as they were. A vital difference between the French and American experiences, however, was the decisive contribution made by the pilots of the US Air Force transport squadrons.

For 77 days during the early part of 1968 the US Marine Corps combat base at Khe Sanh came under siege by elements of the North Vietnamese regular army, and it has been estimated that as many as 20,000 enemy troops were involved at peak strength whilst the Khe Sanh garrison itself numbered only some 6,000 men. With resupply by land out of the question, and with other US and South Vietnamese forces heavily committed to action elsewhere, Khe Sanh was pretty much on its own, and had it not been for US air power it would almost certainly have fallen.

However, fortunately for the forces encircled at Khe Sanh, air support was forthcoming, and this proved to be perhaps the most decisive factor in the successful defence of the base. During the course of the siege tactical fighter aircraft logged more than 24,000 sorties against North Vietnamese forces in the hills surrounding the beleaguered US Marines, these sorties being backed by close to 3,000 Boeing B-52 Stratofortress sorties. But all of this massive effort would surely have been in vain had it not been possible to keep the garrison supplied with arms, ammunition, food and all the other items it needed.

Situated in north western South Vietnam approximately 10 km (6 miles) from the Laotian border and about 23 km (14 miles) to the south of the demilitarized zone dividing North and South Vietnam, Khe Sanh-based troops had for several years been engaged in patrolling the many roads and trails which existed nearby. These all formed part of the so-called 'Ho Chi Minh Trail', the main artery in the flow of supplies from North to South Vietnam, and in view of its importance it is perhaps surprising that the Khe Sanh facility did not come under fire for the first time until January 1966. During the next two years the base came under increasing pressure from Communist forces, but the first signs of the impending siege were not apparent until December 1967 when US intelligence reported a North Vietnamese build-up involving two divisions each of about 10,000 men. Skirmishes involving patrols from Khe Sanh occurred sporadically during the opening weeks of January, but it was not until 21 January that the siege proper began with an unsuccessful attack on a US Marine outpost just across the Quang Tri river, this being quickly followed by an intense artillery bombardment of the base itself. The barrage damaged the aluminium matting runway and set fire to the main ammunition dump, destroying about 1,300 tons of munitions. Fortunately for the defenders, the previous few weeks had given them a valuable opportunity to prepare good defensive positions within the perimeter and these were quickly occupied, while the remaining civilians were evacuated to the relative safety of Da Nang.

With ammunition supplies at a dangerously low level following the destruction of much of the stockpile, the first consideration was to build up stocks, and the airlift effort duly got under way on 22 January, some 116 tons being flown in within the first 24 hours. Although work on repairing the runway had begun almost immediately after the initial barrage it had not been possible to make good all of the damage, so early resupply flights were entrusted to the jet-augmented Fairchild C-123K Provider which could carry a maximum of 7258 kg (16,000 lb) of cargo, rather less than half the payload of the Lockheed C-130 Hercules, which was to be the other principal transport type involved.

At the onset of the siege, airlift capability within South Vietnam comprised six de Havilland Canada C-7A Caribou squadrons with 81 aircraft, four C-123 Provider squadrons with 58 aircraft and three C-130 Hercules detachments with 72 aircraft. Khe Sanh and the major Tet offensive which began at the end of January very quickly spurred some reinforcement, and by March the number of C-130s available had been increased to 96 whilst a further 21 UC-123s assigned to 'Ranch Hand' defoliation missions could have been reconfigured to undertake transport duty had the need arisen. All of these aircraft were under the control of the 834th Air Division responsible for managing airlift resources within South Vietnam.

Operations in support of Khe Sanh were mounted from several air bases including Tan Son Nhut, Cam Ranh Bay and Nha Trang, but the primary source of supplies was Da Nang. This lay closest to the scene of the action, and served as a base for USAF C-123s and US Marine Corps KC-130Fs. Regardless of the point of origin of a particular resupply mission, it was necessary for all airlift aircraft to negotiate anti-aircraft fire within the immediate vicinity of Khe Sanh and this was usually intense and often accurate, at least one US Marine C-130 and one Provider being destroyed whilst many other aircraft sustained considerable battle damage in the delivery of supplies. Once on the ground, the threat of destruction remained ever present, for enemy forces had occupied high ground overlooking Khe Sanh, and could thus mount mortar and rocket attacks. These also accounted for some transport aircraft: one C-123 was lost on 1 March when it suffered an engine fire during its take-off roll as a result of a mortar shell bursting alongside, causing it to swerve off the runway and catch fire although the crew was able to escape. On the same day, another Provider sustained severe damage, the aircraft subsequently being destroyed by mortar fire before repairs could be effected.

Not surprisingly, airlift crews were loath to spend more time on the ground than was absolutely necessary and one method of limiting this involved a procedure known as 'speed offloading': this entailed lowering the cargo ramp, unlocking the cargo pallets when in the unloading area and merely allowing the taxiing aircraft's momentum to take the pallets to the rear, down the ramp and out on to the ground, this process sometimes being assisted by brute force. Whereas unloading an aircraft with forklift trucks could take anywhere between five and ten minutes, this method frequently required just 30 seconds. Nevertheless, the hazards faced in keeping the Khe Sanh garrison supplied were such that the C-130 was banned from landing for much of the time, so the C-123K was the principal visitor, turn-round times from touch-down to take-off generally being of the order of three minutes although on occasion it was accomplished in just one minute.

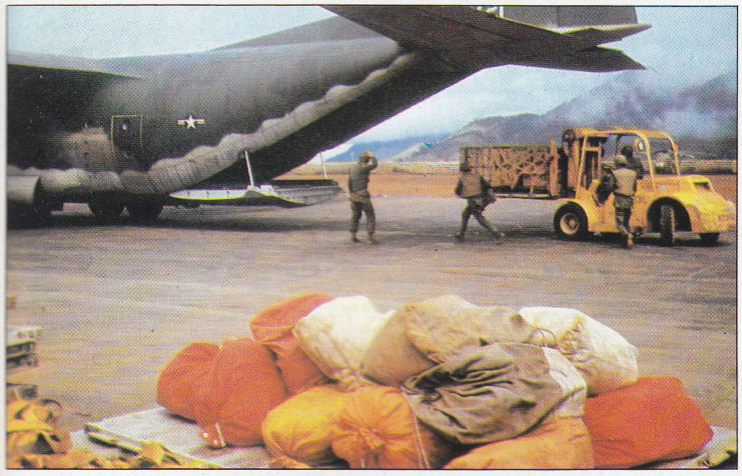
Other methods of resupply therefore had to be employed, these being slightly less hazardous since they did not involve actually landing. One was LAPES (Low-Altitude Parachute Extraction System) which was employed from mid-February onwards by the C-130: the aircraft flew along the runway axis at an altitude of 1.5 m (5 ft) with the hold open; during this pass, a trailing parachute was allowed to open to its full diameter and the sudden drag broke the cargo restraints to drag the special pallet clear of the aircraft and on to the ground, where it skidded to a halt within a distance of about 230 m (750 ft). Another similar method known as GPES (Ground Proximity Extraction System) was also employed, this involving the use of an arrester cable rigged across the runway to engage a hook extending from the pallet and thus pull the cargo clear of the aircraft, which then accelerated and departed in the normal way. GPES was first used at Khe Sanh on 30 March, by which time the specialized equipment required by the LAPES method was becoming scarce and, indeed, the last LAPES delivery was made just a couple of days later, on 2 April.

In addition to these two systems, parachute drops (by both C-123 and C-130) also assisted in the supply effort: the process began in late January and by the end of the siege no less than 601 such deliveries had been accomplished, accuracy being achieved by ground-based radar guidance in conjunction with precise timing by the aircraft navigator. Such was the degree of skill displayed that the C-130 circular error average in all drops was just 100 m (110 yards), although inevitably some bundles of cargo did miss the drop zone. Those that found their way into enemy-held territory were quickly destroyed by bombs or shells, but others occasionally strayed over the US Marine positions, usually without dire consequences, although five men were injured when some containers struck the perimeter on 2 March. By and large, though, such deliveries were accomplished successfully.

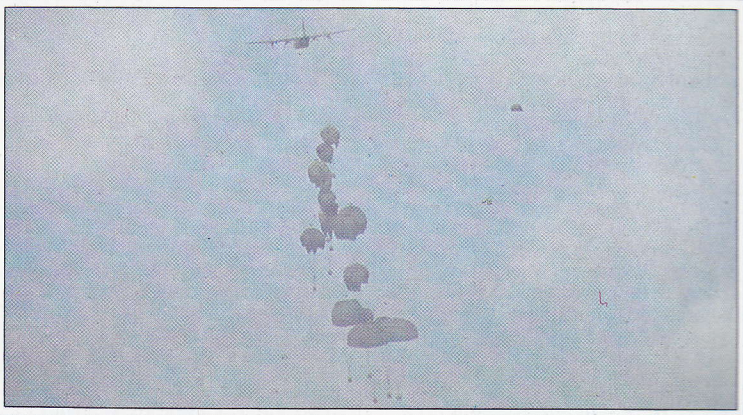
As well as tactical transport aircraft, helicopters also played no mean part in ensuring the survival of Khe Sanh. These were drawn from US Marine Corps units, and were employed in resupplying outlying posts, a task in which they were usually escorted by McDonnell Douglas A-4 Skyhawks operating from Chu Lai. Despite this protection, helicopter losses numbered no less than 17, about 35 more suffering damage of varying degrees of seriousness.

In the event, relief forces fought their way through to Khe Sanh on 8 April, thus bringing the 77-day siege to an end. It is ironic to report that the base was abandoned just a couple of months later. Regardless of one's opinions on the value of the fight for Khe Sanh, it is clear that airlift elements played an instrumental part in enabling it to be defended successfully, for without more than 12,000 tons of cargo delivered between 22 January and 8 April the US Marines would most certainly have succumbed to the numerically superior North Vietnamese forces massed outside the perimeter fence.

Sixteen C-130s of the US Air Force massed for take-off preparatory to an air drop mission over beleaguered Khe Sanh.

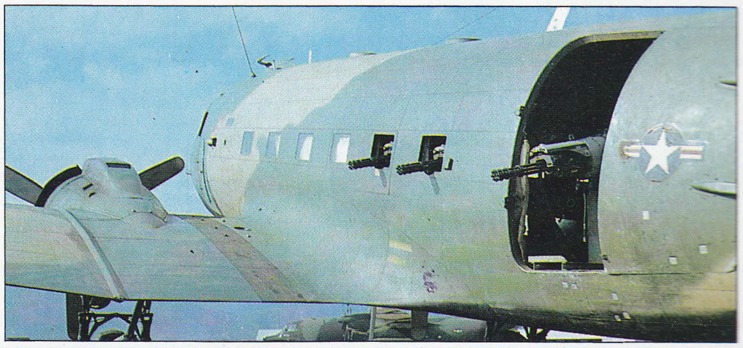


Every second spent on the ground was dangerous. Though unloading was cut down to around 30 seconds, almost every aircraft was damaged.



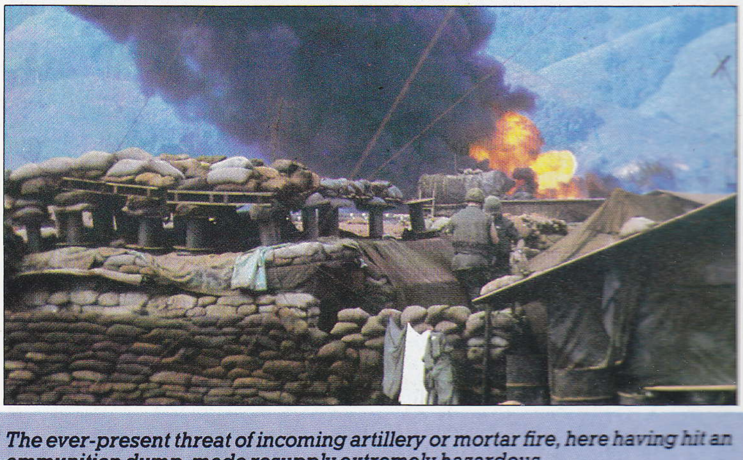
A complete load goes down behind a C-130 (probably a C-130E of the USAF), which typically delivered 15 parachuted supply containers.

Altogether over 12,400 tons of material were delivered to the defenders, much of it in the form of one-ton containers dropped by parachute.



Most spectacular of the transport aircraft supporting Khe Sanh were the AC-47 night gunships, one of which is seen here.

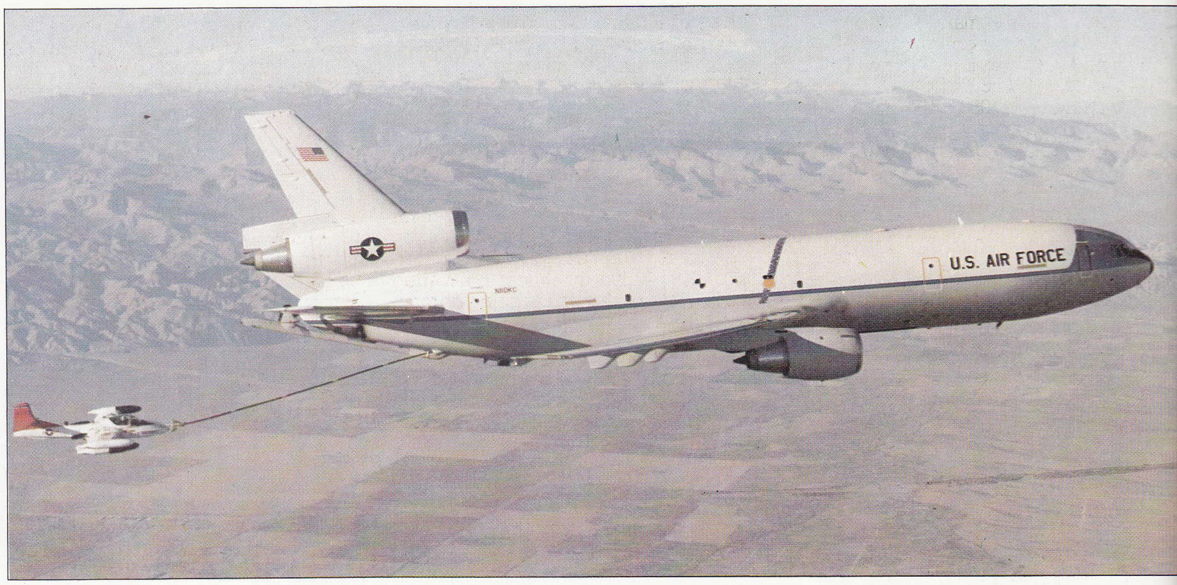
No fewer than 17 US Marine helicopters were destroyed during the siege, at least one being a CH-53 Sea Stallion of the type seen here.



The ever-present threat of incoming artillery or mortar fire, here having hit an ammunition dump, made resupply extremely hazardous.

USA

McDonnell Douglas KC-10 Extender



We are assured this was a genuine part of the trials programme and not just a USAF publicity picture, as the prototype KC-10 Extender passes fuel to a T-37. In fact the KC-10 sometimes has to refuel C-5A and B-52 aircraft which are bigger than itself (B-52 in span only).

One of the more versatile additions to the USAF inventory in recent years, the **McDonnell Douglas KC-10 Extender** possesses genuine dual tanker/transport capability and, indeed, is regularly employed as such in support of major deployment by tactical fighter aircraft. Although principally concerned with aerial refuelling duties, the Extender also possesses significant airlift capacity (76825 kg/169,370 lb), and aircraft from the two squadrons which have formed to date are frequently called upon to augment MAC's fleet of strategic transport aircraft by undertaking missions to Europe and Hawaii.

Essentially a derivative of the commercial DC-10-30CF, the Extender incorporates numerous changes in order to accomplish its military duties. These include the addition of an in-flight-refuelling boom with hose and drogue coupling; provision of a boom operator's station; fitment of additional fuel cells in the underfloor cargo compartments; installation of a refuelling receptacle; and provision of full military avionics equipment.

First flown in July 1980, the **KC-10A** production model had earlier resisted a strong challenge from Boeing, whose Model 747 had also been in contention for the ATCA (Advanced Tanker/Cargo Aircraft) programme. Following a closely fought contest, the USAF elected to purchase the DC-10, McDonnell Douglas receiving authorization to proceed with the construction of two aircraft in November 1978. Initial proposals anticipated the acquisition of no more than 20 KC-10As, but this figure has been sharply revised in an upwards direction, and it now seems certain that the eventual total will be 60 when deliveries are completed shortly before the end of the present decade.

Since entering service with Strategic Air Command at Barksdale in spring 1981, the Extender has supported a considerable number of overseas deployments, but perhaps the most impressive demonstration of its capabilities came in October 1982 when one aircraft escorted six McDonnell Douglas F-15C Eagles on a non-stop flight from Kadena, Okinawa, to Eglin AFB, Florida. During the 15-hour, 11265-km (7,000-mile) trip the KC-10A furnished fuel to the F-15s seven times and also airlifted 59 personnel and 24950 kg (55,000 lb) of support equipment, itself receiving fuel from another KC-10A and two KC-135s whilst en-route.

Specification

McDonnell Douglas KC-10A Extender
Type: strategic inflight-refuelling tanker and transport aircraft
Powerplant: three 23814-kg (52,500-lb) thrust General Electric CF6-50C2 turbofans
Performance: cruising speed 908 km/h (564 mph); service ceiling 10180 m (33,400 ft); range 7032 km (4,370 miles) with maximum 76825-kg (169,370-lb) payload
Weights: empty 108891 kg (240,065 lb); maximum take-off 267620 kg (590,000 lb)
Dimensions: span 50.41 m (165 ft 4.4 in); length 55.35 m (181 ft 7 in); height 17.70 m (58 ft 1 in); wing area 367.7 m^2 (3,958 sq ft)

CANADA

de Havilland Canada DHC-4 Caribou

The first large STOL aircraft to be produced by the company, the **de Havilland Canada DHC-4 Caribou** came about in response to a 1956 conference between this manufacturer and representatives of the US and Canadian armies, both of which had identified a need for a genuine STOL type.

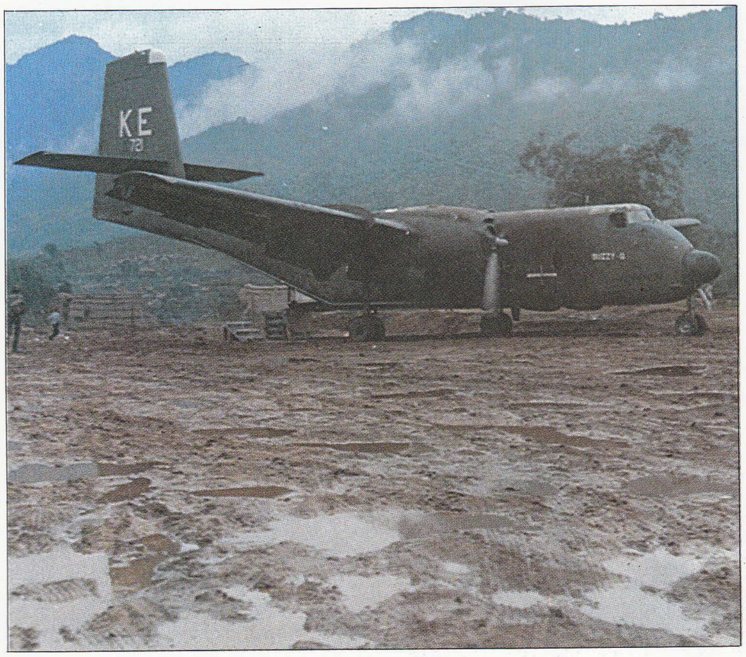
The prototype flew for the first time on 30 July 1958, and a batch of five early Caribous was ordered by the US Army for an exhaustive evaluation programme, these initially being given the designation **YAC-1** although it was later changed to **CV-2A**. The aircraft's performance was such that the US Army subsequently ordered no less than 159 production specimens (56 to CV-2A and 103 to **CV-2B** standard) for delivery in 1961-4 although in the event this service was destined to operate the type for only a fairly short time, 134 of the surviving machines being transferred to the US Air Force on 1 January 1967.

Known in USAF parlance as the **C-7A** and **C-7B**, most of these machines were employed in South Vietnam, where the Caribou's startling short-field characteristics enabled it to fly into airstrips which could not handle the two other major transport aircraft used in the theatre, namely the Fairchild C-123 Provider and Lockheed C-130 Hercules.

With the US withdrawal, a considerable number of Caribous was turned over to the South Vietnamese air force, but some also returned to the USA for service with the Air National Guard and the Air Force Reserve, the last examples of which have only fairly recently been retired.

Capable of carrying up to 32 fully-equipped troops, 24 paratroops or a 3048-kg (6,720-lb) cargo payload, the Caribou also proved attractive to a number of overseas air forces and by the time production terminated in 1973 examples of the **DHC-4A** major production type had been delivered to such countries as Abu Dhabi, Australia, Ghana, India, Malaysia, Spain, Tanzania and Zambia. In addition, it was also purchased by the then Royal Canadian Air Force, which obtained nine as the **CC-108**, these seeing extensive service with United Nations peace-keeping echelons in the Middle East and Africa.

Production of the Caribou totalled approximately 300 aircraft, many of which are still active today.



During the Vietnam war the de Havilland Canada C-7A Caribou STOL transports of the US Army were passed to control of the USAF on 1 January 1967. This C-7 was pictured after fitting radar whilst on front-line resupply duty. The RAAF also used Caribous in Vietnam.

Specification

de Havilland Canada DHC-4A Caribou
Type: STOL tactical transport aircraft
Powerplant: two 1,450-hp (1082-kW) Pratt & Whitney R-2000-D5 Twin Wasp radial piston engines
Performance: cruising speed 293 km/h (182 mph) at 2285 m (7,500 ft); service ceiling 7560 m (24,800 ft); range 390 km (242 miles) with maximum payload
Weights: empty 8283 kg (18,260 lb); maximum take-off 12298 kg (28,500 lb)
Dimensions: span 29.15 m (95 ft 7.5 in); length 22.12 m (72 ft 7 in); height 9.67 m (31 ft 9 in); wing area 84.7 m^2 (912 sq ft)

CANADA

de Havilland Canada DHC-5 Buffalo

Fourth in the remarkable line of STOL aircraft to emerge from the de Havilland Canada stable, the **de Havilland Canada DHC-5 Buffalo** began life in response to a 1962 US Army request for proposals for a new 41-seat tactical transport. Originally known as the **Caribou II**, the DHC project was just one of 25 submissions but emerged victorious and was subsequently rewarded with a contract for four evaluation specimens, the first of which made its maiden flight during April 1964. In the event, the **CV-7A** (as it was designated in US service) failed to secure any further US Army orders, most probably as a result of that service being forced to dispose of its relatively few large fixed-wing aircraft to the US Air Force at the beginning of 1967.

Despite this unfortunate beginning, the Buffalo has since enjoyed a measure of success, more than 100 being built and production continuing at a rate of around 12 per year at the time of writing. The first noteworthy order originated from the Canadian Armed Forces which acquired 15 **DHC-5A** aircraft for tactical transport tasks under the designation **CC-115**, although some have since been adapted for maritime functions. One major source of export orders has been Latin America, the Buffalo's almost unrivalled short-field performance being particularly attractive to both Brazil and Peru which between them obtained no less than 40 before production terminated in 1972.

In the event this hiatus proved to be only temporary, DHC endeavouring to secure an order from India in 1974 with a couple of proposals based on the use of different powerplants. These efforts proved unsuccessful, but several other potential customers had appeared on the scene and the line was therefore reopened in 1974, the variant now in production being the **DHC-5D** which possesses rather better performance. Since then, it has remained open, customers which have purchased the type in recent years including Egypt, Ecuador, Kenya, Mauritania, Mexico, Oman, Sudan, Tanzania, Zaire, and Zambia. This model can carry 8164 kg (18,000 lb) of freight, or 41 troops, or 34 paratroops, or 24 litters plus six attendants.

Specification

de Havilland Canada DHC-5D Buffalo

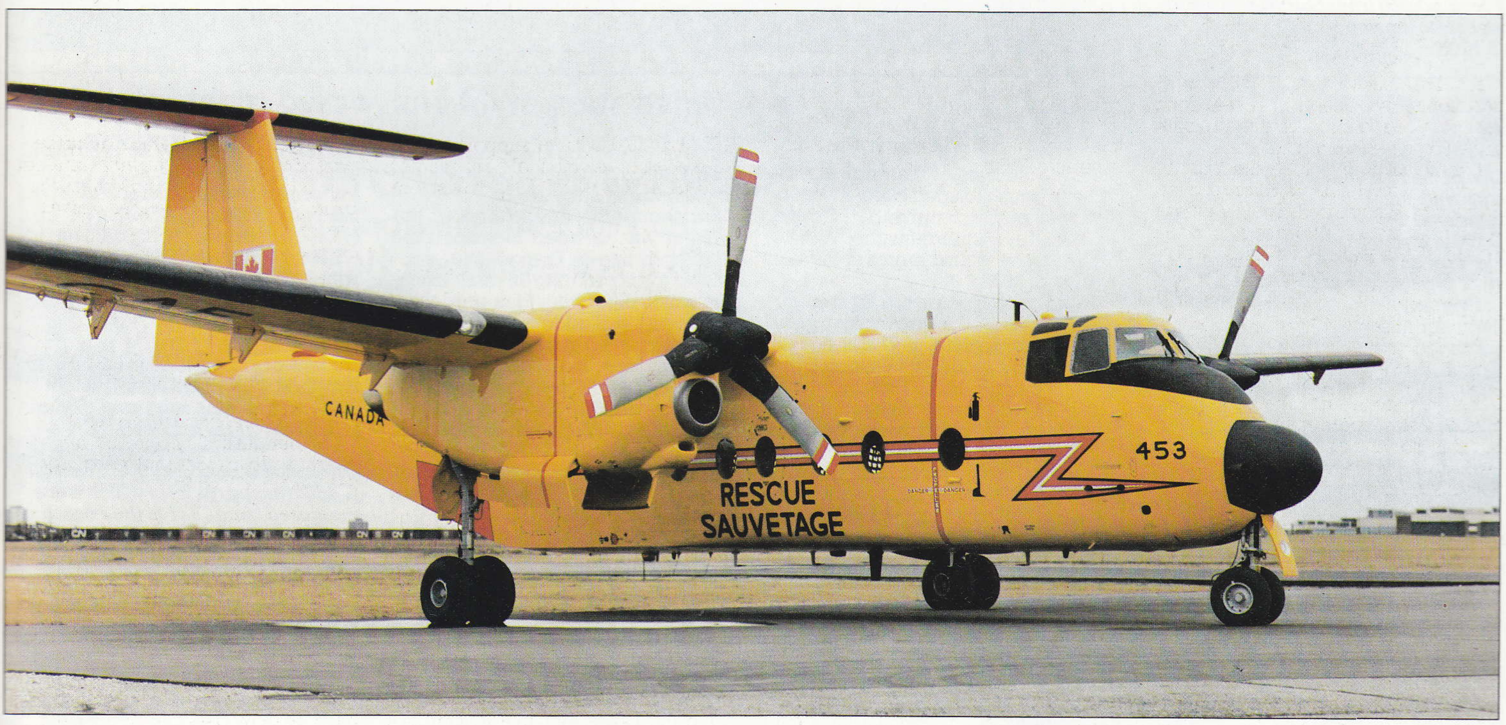
Type: STOL tactical transport aircraft

Powerplant: two 3,133-shp (2336-kW) General Electric CT64-820-4 turboprops

Performance: cruising speed 420 km/h (261 mph) at 3050 m (10,000 ft); range 1112 km (691 miles) with maximum 8164-kg (18,000-lb) payload

Weights: empty 11412 kg (25,160 lb); maximum take-off 22316 kg (49,200 lb)

Dimensions: span 29.26 m (96 ft 0 in); length 24.08 m (79 ft 0 in); height 8.73 m (28 ft 8 in); wing area 87.8 m² (945 sq ft)

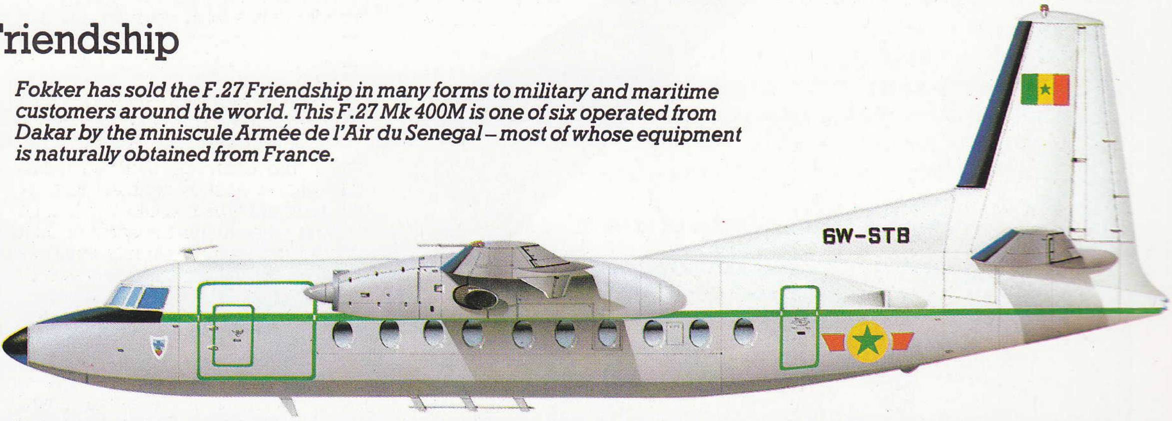


One of the operators of the de Havilland Canada DHC-5 Buffalo is the Canadian Armed Forces, which designates them as CC-115s. These STOL transports are equipped for SAR missions, flying with Nos 413, 424 and 442 Sqns from CFB Comox, Trenton and Summerside.

NETHERLANDS

Fokker F.27 Friendship

In terms of numbers sold, the most successful post-war European airliner has been the **Fokker F.27 Friendship**, and the type has also proved to be a popular medium military transport, variants of the type currently serving with close on 20 air arms throughout the world.



Fokker has sold the F.27 Friendship in many forms to military and maritime customers around the world. This F.27 Mk 400M is one of six operated from Dakar by the miniscule Armée de l'Air du Senegal – most of whose equipment is naturally obtained from France.

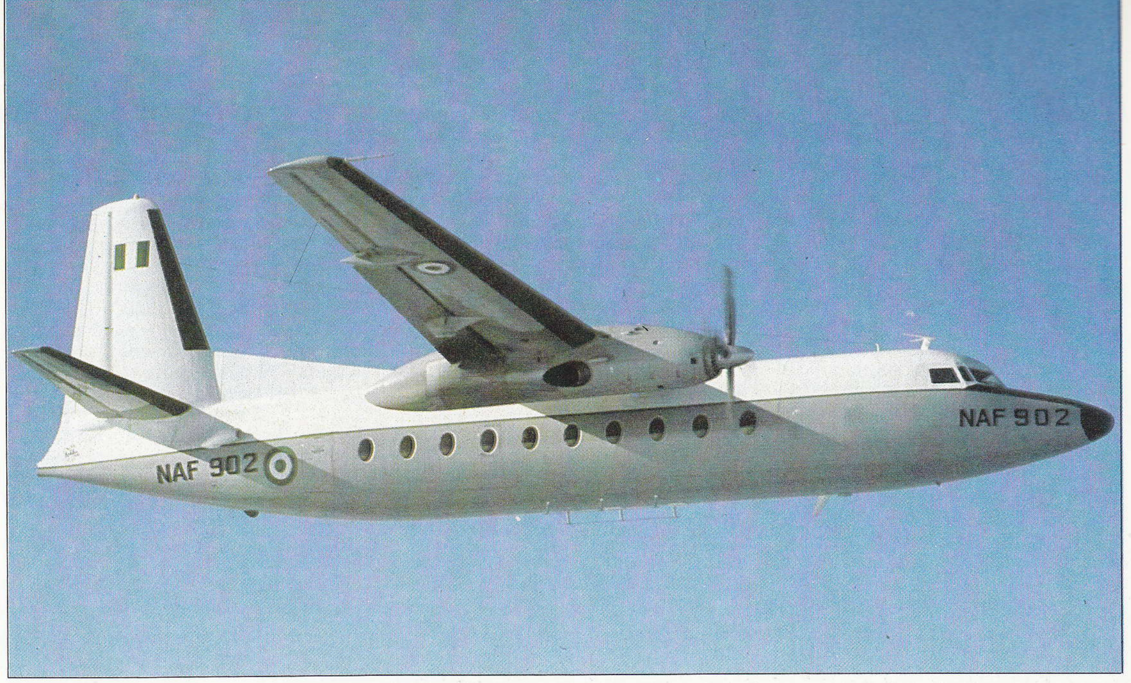
Small numbers of the early production **F.27 Friendship Mk 100, Mk 200** and **Mk 300** models are still active with several air forces, but the most prolific derivative with regard to military contracts has been the **F.27 Friendship Mk 400** combiplane, about 70 **F.27 Friendship Mk 400M** aircraft being built specifically for military customers such as Algeria, Argentina, Iran, Nigeria and Sudan. Incorporating a freight door on the port side of the forward fuselage and flown for the first time during 1961, the F.27 Mk 400 can carry up to 45 paratroops or 6025 kg (13,283 lb) of cargo. Other variants which have been adapted for military transport duties with some success are the **F.27 Friendship Mk 500**, which features a 1.5-m (5-ft) fuselage stretch, and the current **F.27 Friendship Mk 600**, both of these also possessing a freight door to facilitate the loading of large items of cargo. Combined military sales number about 15, most being F.27 Mk 600s.

The most recent addition to the Friendship family has been the **F.27MPA Maritime**. Now operational with the Netherlands, Peru, the Philippines and Spain, this features Litton search radar with its aerial in a prominent ventral radome, as well as inertial navigation equipment, a radar altimeter, a new autopilot and a more modern and comprehensive array of communications gear. Auxiliary fuel tanks mounted under the wings help to increase endurance, and the F.27MPA can remain aloft for up to 10 hours at a time. Lacking the facility to carry armament, the Maritime derivative is mainly intended for peacetime duties such as fishery patrol, oil platform surveillance, search and rescue and environmental control, but Fokker has recently been conducting studies of a version with more warlike applications. This is the **Maritime Enforcer** for anti-submarine warfare, optional equipment including new radar, forward-looking infra-red sensors, sonobuoy processing equipment and a magnetic anomaly detector, whilst armament could include either anti-ship missiles or torpedoes.

Fokker F.27 Friendship (continued)

Specification

Fokker F.27 Friendship Mk 400M
Type: medium-range tactical transport aircraft
Powerplant: two 2,140-shp (1596-kW) Rolls-Royce Dart Mk 532-7R turboprops
Performance: cruising speed 480 km/h (298 mph) at medium altitude; range 2210 km (1,373 miles) with maximum 6420-kg (14,153-lb) payload
Weights: empty 10600 kg (23,369 lb); maximum take-off 20410 kg (44,996 lb)
Dimensions: span 29.00 m (95 ft 2 in); length 23.56 m (77 ft 3.5 in); height 8.50 m (27 ft 11 in); wing area 70.00 m^2 (753.5 sq ft)



F.27 Friendships serve with a single F.28 Fellowship in the Nigerian Air Force, whose transport fleet at Lagos also uses the much more capable C-130H.

FRANCE/WEST GERMANY

Transall C.160

One of the handful of types which have achieved the rare distinction of being reinstated in production, the **Transall C.160** is again in process of delivery to the French air force, albeit in somewhat improved form.

Originally conceived as a replacement for the Nord Noratlas, which equipped transport units of France's Armée de l'Air and West Germany's Luftwaffe, the C.160 was one of the first successful joint European aerospace ventures, being produced by a consortium of companies which was collectively known as the Transport Allianz group. Indeed, the name and designation chosen for the resulting machine reflected the origins of the project, for the initial quantity to be acquired was set at 160 (50 **C.160F** aircraft for France and 110 **C.160D** aircraft for West Germany) whilst the name was merely a contraction of Transport Allianz. Members of the original production group included Nord-Aviation, Hamburger Flugzeugbau (HFB) and Vereinigte Flugtechnische Werke (VFW), these joining forces at the beginning of 1959.

Three prototypes were built in all, one by each of the three major partners in this venture, and the first of these made a successful maiden flight on 25 February 1963. They were followed by six pre-production specimens from May 1965 whilst production-configured C.160s began to emerge in the spring of 1967, deliveries getting under way soon afterwards, and by the time manufacture ceased in 1972 a total of 169 had been built. In addition to the 160 supplied to the two principal partners, nine more of a variant known as the **C-160Z** were sold to South Africa, the only other air arm to operate the original type being that of Turkey, which took delivery of 20 **C.160T** aircraft (former Luftwaffe examples) in the early 1970s.

Subsequently, at the end of the 1970s, it was decided to reopen the production line in France, that country's air force ordering 25 more examples which differ from their predecessors by virtue of additional fuel capacity and improved avionics gear. Range limitations have been partly resolved by the extra centre-section fuel tank, but the newest C.160s also feature inflight-refuelling capability in the form of a probe above the cockpit. Maximum payload is 16000 kg (35,275 lb), while 93 troops or 88 paratroops can be accommodated.

Specification

Transall C.160
Type: medium tactical transport aircraft
Powerplant: two 6,100-ehp (4,549-ekW) Rolls-Royce RTy.20 Tyne Mk 22 turboprops
Performance: maximum speed 592 km/h (368 mph) at 5000 m (16,405 ft); service ceiling 8230 m (27,000 ft); range 4800 km (2,983 miles) with 8000-kg (17,637-lb) payload
Weights: empty 28760 kg (63,405 lb); maximum take-off 51000 kg (112,435 lb)
Dimensions: span 40.00 m (131 ft 3 in); length 32.40 m (106 ft 3.5 in); height 12.37 m (40 ft 7 in); wing area 160.0 m^2 (1,722.3 sq ft)

One of the second batch of Transall C.160 transports, 29 of which were delivered from 1981 to the French Armée de l'Air. All have inflight-refuelling booms, and 10 have a tanker hose-drum unit in the left main-gear pod. The last four are special communications relay platforms.